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NEWS IN BRIEF

Wider use of networks

PROFESSOR Michael Beesley has presented his report on the economic implications of liberalising the use of British Telecom's transmission networks, to the Department of Industry. A DoI spokesman said that people in the Department would now look at the report and take action where necessary, including on whether to publish any of it.

Professor Beesley is to speak at Infotech's conference on public data networks in London from March 9 to 11.

New Sunday paper

PLANS by the owners of the Daily Mail to start a new Sunday newspaper could give new technology in Fleet Street a major boost. Although the proposal by Associated Newspapers is still tentative, managers there are convinced that a new publication would not be started using old technology, and are envisaging editorial and printing work being carried on in different buildings, connected by communications links.

Takeover bid fails

A SHARE swap takeover bid by Data General for graphics display manufacturer Megatek, originally valuing the San Diego company at \$17 million, has been rejected. But Megatek has denied that its reason was the fall in the value of Data General shares.

NY fire was arson

THE fire at the Stouffer's Inn hotel in suburban New York from which several IBM executives escaped late last year has been declared a case of arson by officials of Westchester County. The fire killed 13 executives of Arrow Electronics, the biggest components distributor in the US.

COMPUTER WEEKLY

Tran brings down Amdahl profits

A SLIGHT profit decline for fiscal 1980, ended December 26, has been reported by Amdahl in a set of results for the year that show turnover up by 23% to \$394 million compared with 1979. The figures for both years published by Amdahl include the results of Tran, the data communications manufacturer acquired by Amdahl in July 1980.

According to Amdahl, Tran was making a positive profit contribution by the fourth quarter of 1980 compared with losses that would have caused the combined companies to record a \$1.3 million loss in the 1979 fourth quarter.

The combined results for 1980 show a net profit figure down \$200,000 to \$15.2 million, suggesting that Tran continued to make serious losses well into 1980. No separate 1980 turnover figures for Tran were made available by Amdahl but Tran's own results for 1979 showed a turnover of about \$22 million.

Based at Marina del Rey, California, Tran builds the M3200 integrated digital network system which can carry voice, facsimile and image information as well as data. It can be used in an IBM Systems Network Architecture environment.

Another big development for Amdahl in 1980 was the November launch of the 580 series, its response to the IBM 3081. At the same time, purchase prices on the existing 470 machines were cut by 17%.

Pressure grows for UK data protection law

by Rory Johnston

PRESSURE on the Home Office to take action on data protection has now reached such a level that the Department is expected finally to break its long silence on the subject and make its intentions clear.

Several MPs and even a senior civil servant from the Department of Industry are now calling for legislation, and the British Computer Society has formally offered to operate a data user-registration scheme in the absence of a Data Protection Authority.

Roy Croft, deputy secretary at the Department of Industry, told

the Computing Services Association that data protection legislation was now "vital" for the UK "to remain competitive in international business."

He added, however, that the legislative calendar was so crowded that it was unlikely an Act could be passed in this session.

Conservative MP Dudley Smith is tabling Parliamentary questions to the Home Secretary about the government's intentions regarding the Council of Europe's convention on data protection. Smith is a representative to the Council and was present last week at the signing of the convention by seven countries, indicating their intention to ratify it in their Parliaments

and so bring it into effect.

The countries that have signed so far are Denmark, West Germany, Sweden, France, Luxembourg, Austria, and Turkey. A country is not allowed to sign unless it has domestic legislation on data protection; other nations that have indicated their intention to legislate and then sign are the Netherlands, Belgium, Italy, and Switzerland.

The UK government agreed to the draft convention in October, but has taken no further action.

Also on the international front, privacy pressures in France have forced the government there to drop plans for a machine-readable personal identity card that was to

act as a surrogate passport, enabling quick checking of travellers at border crossings. A new plastic card with elaborate guards against forgery has been produced, but without the magnetic stripe that it was to have carried.

The main objection to the magnetic stripe was that it was not naked-eye-readable, and could therefore contain information of which the bearer was not aware. In consequence it was suggested that the printed information on the card should be in OCRB font so it could be machine-read by optical scanning, but even this idea was opposed by the National Committee for Informatics and Liberty, and consequently dropped.

The card is not in theory obligatory for citizens to carry, but a new law requiring some means of identification has just been passed. The BCS is offering its services to operate an organisation willing to hold files of personal data, and to register individuals who keep such files. Overseeing the professional structure of the processing and laying down standards would be involved, according to the BCS Privacy Committee's plans.

aimed at Computer Associates' traditional IBM market.

According to Harry Gordon, CA's new UK managing director, Express software will sell products in the systems performance and program development field, "typically under £2,000". "We're

aiming at a low-overhead, high volume operation," he comments.

CA claims to have installed over 10,000 products in 50 countries - at the rate of 300 monthly - and expects this year's sales to double its turnover to \$20 million, including £1 million from the UK.

Telephone selling in IBM market

by Claire Gooding

AMERICAN-STYLE selling is coming to the UK with Computer Associates' Express Software venture. The new marketing operation, based on telephone selling and direct-mailing, is part of a major new sales drive to Europe

At the same time, the company has announced the availability on the 2955, the other new 2900 is launched last November, of VME/B-B, the stripped-down "simple use, quick to install" version of VME/B.

Differences between the 2977 and the 2976 include a 16K-byte cache store, restricted so far to the top-end 2982, 424 current page registers compared with only 16 on the 2976, and an address translation unit that operates simultaneously with the rest of the logic to achieve faster throughput.

ICL says that the air-cooled 2977 is aimed at the same market segment as the 3033S, the bottom end machine in the IBM 3033 family. It quotes £1.2 million for a 2977 configuration with a six-megabyte main memory and 3,200 megabytes on disc.

Main memory can be expanded to a maximum of 16 megabytes and options include the Distributed Array Processor. Scientific processing can also be boosted by

adding the fast multiply and divide unit to the Order Code Processor.

The 2977 OCP is based on the original 2980 OCP, like the OCPs in the 2976 and 2982, and the new machine slots into the Common Storage System range of 2900s that can be enhanced from the 2960 right up to the 2982.

The 2966 is the one exception because it employs the Store Control Unit and Device Control Unit with the smaller 2900s rather than the Store Access Control Units and Store Multiple Access Control units common to all the CSS machines.

For DMB users moving over to VME, the 2977 can be run with a 2960 using the attached emulation facility. The 2977, like the other big 2900s, is not a microcoded machine and therefore does not support either DMB or Concurrent Machine Environment. CME is the facility, available on the 2966 downwards, which enables DMB and VME workloads to be run together.

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Burroughs brings in an outside

FINANCIALLY troubled Burroughs is taking advantage of new early retirement provisions to replace its existing executive vice-president of engineering, manufacturing operations, in California. The new man is Paul Fisher, an outsider who was formerly president of commercial electronics operations at Rockwell International.

Cal is expected to join March of the age of 58. Burroughs has been reported as describing his departure as "amicable". Cal appeared to be an early retirement candidate. At the same time the company's chairman, Michael Blumenthal, is believed to have been severely critical of the manufacturing operations.

The appointment of Fisher is in line with Blumenthal's policy of bringing new blood into the company from outside. Last September he appointed as vice-president of the Burroughs Jerome Jacobson, a veteran of strategic planning.

Blumenthal looks to normal practice to fill top jobs in the company from within. Burroughs has reported a nearly \$60 million loss in the quarter of 1980, which is a profit for the whole of 1979 of \$82 million, more than \$1 million down on the 1978 figure. The loss related to a million write-off of obsolete returned machines.

CONFERENCE FIRM FAILS WITH DEBTS OF OVER £700,000 AND 113 OUT OF JOBS

Infotech goes into liquidation

by Paul Fisher

INFOTECH LTD, the Maidenhead-based training, publishing and conference company, went into voluntary liquidation on Friday. As a result 113 people have lost their jobs.

Its debts are between £700,000 and £1 million and estimates are that creditors will receive between 7p and 15p in the pound. The creditors include Trust House Forte, Grand Metropolitan Hotels and a number of lecturers, some of whom are owed several thousand pounds.

Chairman Clive Wilkins, who has been with the company since its early days in 1970, blames the recession and the fact that many expected orders had not materialised.

He says: "We were geared up for growth and it was difficult to gear down."

The company has been expanding at an annual rate of 50% since

1975 and last year's turnover was £3 million.

Wilkins adds: "The real sadness is in the breaking up of several remarkable teams of people. It is mitigated, however, by the fact that they will readily find acceptance on the open market."

Sources within the company say that the speed of the crash came as a surprise. Wilkins acknowledges that an increase in European business, to offset a decline in the UK, has happened too late to make any difference.

Legal action

The demise of Infotech, the largest company of its kind in Europe, will leave a void in the training market. Companies like Commercial Union, SAS, Swissair and Den Danske Bank stand to lose considerable sums that have been paid for advance bookings. Texas Instruments could lose well over £10,000.

There were problems early in 1980 with legal action over the copyright of lectures belonging to a major contractor, Keith Jackson, now of CMS. He was recently paid £15,000 of a total £30,000 which was agreed to be owing. "His decision to claim the money sped up the closure," says Wilkins.

Jackson is claiming a further £30,000 for advanced bookings until the end of 1981.

A boardroom split at the end of the summer saw three directors leave to form Xephon Technology. Roy Goodman, the founder, used his major shareholding to assert himself on the board and, in the spring, appointed himself chairman and managing director. The dispute was patched up with Goodman having two-fifths of the voting rights and Wilkins plus fellow directors John Blake and Chris Boon splitting the remainder

WILKINS... "The real sadness is in the breaking up of several remarkable teams of people."



Unions plan to halt govt computers in pay deadlock

by Rory Johnston

INDUSTRIAL action to halt government computers now seems "a certainty," say trade unionists fighting for an increased pay offer for civil servants. This follows a deadlock meeting with Ministers Lord Soames and Barney Hayhoe.

Mass meetings are being held this week for consultation before a final decision on action is taken on February 26.

At the 174-hour meeting on Monday, the Ministers stated there was no question of a settlement this year based on comparison with outside pay rates, nor could there be any arbitration, because of the government's determination to stick to cash limits.

Government plans to draft in other staff to run computers were condemned by Tony Christopher, general secretary of the Inland Revenue Staff Federation, saying such action could make working together after the dispute very difficult.

"It was also afraid that irresponsible statements in his own could be provoked into sabotaging the computers, which would lead to expulsion from the union."

In the separate dispute over pay for health service computer staff, a halt has been called to one-day selective strikes while investigations are carried out on how much money is available.

Operation of accounting systems is still being blocked, however.

Briefing

Memorex \$29m loss

MEMOREX Corp last week delivered its expected loss for the year and for the final quarter of 1980. The loss for last quarter was \$3.2 million and the loss for the year as a whole was \$29 million.

Turnover of Memorex grew by \$31 million, from \$737 million in 1979 to \$768 million in 1980.

Chairman C. W. Spangle said the fourth quarter was the second consecutive improvement per quarter, despite the loss.

First in Europe

AFTER running a Xerox 9700 high speed laser printer on a trial basis for a year, service bureau Seao Laser Printing has bought the machine and ordered a second for shipment next month. Located at Scan Laser centres at London and Slough they will be the first two 9700 installations in Europe.

WP institute

A PROFESSIONAL Institute for word processor operators is being set up by a group of WP supervisors, managers and consultants to "promote and uphold professional standards." The Institute of Word Processing has opened an office in London and is drawing up plans for exams and training.

NAS move

FOLLOWING the launch by IBM of the 3081 which roughly matches the performance of the single processor Hitachi M200H, National Advanced Systems is to sell the dual processor M200H to IBM compatible form as the AS/9000 DPC. The single processor M200H is already sold by NAS, BASF and Olivetti Computers.

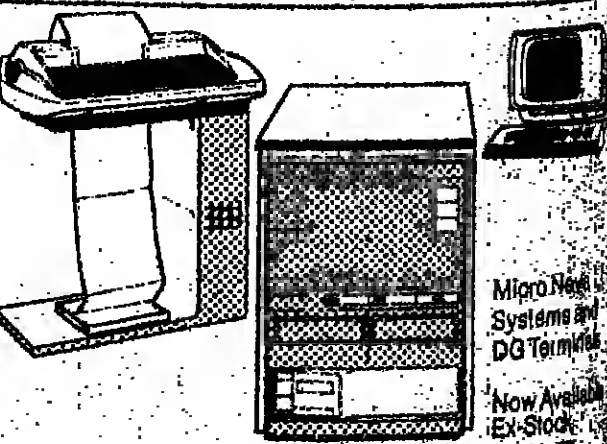
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IBM 'growth' is no growth

by Hesh Wiener, Technology News of America

THE IBM annual report, due for release in about ten days' time, shows that inflation in the US has not shareholders nearly one-third of the marketable value of their shares.

Adjusting for inflation using the 1980 dollar as a constant, the IBM share was worth \$67.88 on December 31, 1980. On the same basis the share was worth \$73.9 in 1979, \$94.26 in 1978 and \$101.1 in 1976.

The report shows that with inflation taken into account the earnings improvement in 1980 was actually a fall on the previous figures of \$78 million, from \$2,551 million to \$2,473 million, adjusted for inflation.

The volume of machines and parts on rental leaped by from \$1,610 million in 1978 to \$15,352 million, showing an overall increase in rental of 31% for the last two years.

Working capital at IBM fell from \$4,406 million to \$3,399 million over the year.

Borrowings over the past two years were \$2,000 million and the company still has unused credit lines of \$2,875 million. According to the company there is a requirement for significant investment in the years ahead. This comment is taken by commentators to mean that IBM will be making further borrowings in 1981.

The number of employees rose to 341,729 from 337,119 in 1979.

There was a big jump in earnings in the European, African and Middle East division, from \$1,082 million in 1979 to \$1,511 million in 1980.

Noting that \$207 million of net earnings were due to year end tax changes in the US, the report said that the company expected "the cost of investment to be high with continuing pressure on margins."

Govt ducks MP's question on aid to ICL

THE government has refused to give any assurance that it will rescue ICL should the company's problems get worse.

Replying to questions on Monday from MPs on both sides of the House of Commons about whether he would guarantee the future of the company, Information Technology Minister Kenneth Baker replied only that he "did not have no formal request for aid."

MP Hugh Dykes asked if the government intended "to do anything about ICL or was going to stand idly by."

Baker replied, "I've heard nothing from the company," but added that the cuts announced by chairman Philip Chappell "were necessary to strengthen the company."

He went on: "My department is in consultation with ICL over its R&D programme as with other companies."

It seems now very unlikely that the government will bring ICL back under the wing of the National Enterprise Board, as some reports have suggested.

A group of MPs including Robert Carr (Lab), Stoke-on-Trent, have written to Industry Secretary Sir Keith Joseph about ICL, saying: "The time for intervention is now," and asserting it would be "a tragedy if ICL were relegated to the status of a third rate computer company."

The firm's problems may soon become "insuperable," they said.

Software growth

RENTED software is on the increase according to a survey by the National Computing Centre. The survey, conducted by Department of Industry, found that expenditure on software in 1981 would be 50% up on the 1979 figure to £74 million.

INSIDE THIS WEEK'S CW

Computervision	13
Letters to the Editor	14
Terms and prices	14
Downside by Chris	15
Bill on lost computers	16
GAO's warning on federal	17
Portronics expanding	18
Computers in shipping	19
Software file	20
Company news	21
On spec	22
Programmer Page	23
People and Events	24
Robot for mail-makers	25
Office of the future	26
Date Analysis - Part 17	27
Review of the industry	28
Viewpoint in business	29
Computers in shipping	30
Product News	31
Advertiser's Index	32
Index	33

JOB OPPORTUNITIES: Pages 26-47

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COMPUTERVIEW

IN less than ten years, the world market for speech synthesis could reach \$4 billion, says National Semiconductor. This figure has been echoed by Texas Instruments which puts the market value at a slightly lower \$3 billion at the end of the decade. These similar opinions from two of the major companies in the market both reflect the degree of importance that should be given to speech synthesis over the next few years - or do they?

Media reports have spoken convincingly of the virtue in making all sorts of machines repeat the same phrases time after time. But how many of us would really like to hear "Have you fastened your seat belt", every time we enter our cars, or "The time is 7.30, your tea is ready" whenever we wake in the morning?

In fact, the enthusiasm given to speech synthesis by US and Japanese companies could be interpreted purely as a race for scientific achievement. It is always satisfying to a scientist or engineer to achieve the so-called "impossible" regardless of its practicality.

The current stage of development reached by US companies certainly fosters this impression. National Semiconductor recently gave a presentation incorporating demon-

Talking machines

strations along the lines previously mentioned: a speaking tea machine, car and doll; and speaking games and scientific equipment. Texas Instruments has incorporated speech into its personal computer, the 99/4, and other educational toys and games such as Speak and Spell.

With a little more thought, the true potential of speech synthesis can be realised. Companies concentrating on its development are unfortunately not in a position to demonstrate this potential.

Awareness of and enthusiasm for speech synthesis will not emerge to any great extent until interfaces and applications have been developed to go with it.

At the moment the use of speech to attract attention gives no more information than other indicators such as buzzers and flashing lights. It is to this area that greater thought must be directed, and there is no reason why the incorporation of speech within a product should not greatly enhance the information output.

The simple car example of "Have you checked your oil" could, with the addition

of sensing circuitry, be modified to say "Your oil level is low, add two pints" or "The fuel will last another 10 miles at your present speed".

Many other applications exist and National Semiconductor has named but a few. Fire alarm systems in buildings could incorporate speech to say exactly where the fire is, which stairs or lifts to use and which not, or even give directions to assist people's exit from the building.

Speech has numerous applications in telecomm. For example, when a caller tries to reach a person at a number, the telephone person could be contacted, or when the person was likely to return to the original number.

Speaking machines are, of course, invaluable to the blind and could help them to participate in activities which at the moment are not available to them. With the aid of a voice, blind people could learn how to operate equipment. Their mistakes could be verbally communicated. On a more domestic level, a speaking clock could certainly

make a blind person's life more efficient. Other applications exist in a variety of areas: supermarket check-out systems, the medical diagnostics world, and in the prevention of accidents.

However, there is another reason for the development of speech synthesis - speed of recognition. Speech recognition in practice involves comparing a spoken word or phrase to those stored in memory and choosing the most similar in order to make the correct response. The complexity of the system required depends on the size of the word store.

The Japanese are fast developing the synthesis and recognition to assist in the word processing. Keyboard is almost a physical impossibility for the Japanese alphabet, as it involves thousands of characters. The incorporation of speech recognition eliminates the need for a keyboard.

With a need as important as this, Japanese almost certainly have reached the same level of development as the US companies, and have probably got further. National Semiconductor expects to have developed a speech recognition module by 1983.

LETTERS to the EDITOR

The creation of information

MAY I attempt to throw in a fresh point of view into the debate between Alan Sutcliffe and Donald Michie? (CW, January 8).

Let us first try to define what we mean by "information". All entities interact with their environment, actively or passively. This interaction is achieved by transfer of information across the interfaces between the entity and the environment.

Thus, a hot body communicates by emission (radiation) of heat energy. This energy may therefore be regarded as constituting information. The knowledge thus transmitted in this rudimentary case is the existence of the hot body.

Equally, the transmission may take the form of light waves or other electromagnetic radiation. A radio receiver having a DC meter in its detector circuit can determine the existence of a remote radio transmitter, by reception and indication of its carrier. This information ("existence") may itself be "new", and so satisfy one accepted criterion for "information".

If, however, the carrier be modulated in a manner which has significance ("meaning") to the receiving body, the information content of the transmission is profoundly enhanced.

Please note that the receiving body does not require to possess that which we term "intelligence" for the receipt of the information to be effective. For example, a level detector at a water reservoir might cause a signal to be sent to a remote control valve, which is opened if the water level falls below a predetermined value.

Has information been created in this very simple case? Firstly, information on water level conveyed to the level-sensor device. If the information is created fully, it must be at this interface. Therefore, it is merely a matter of extending the transmitter and subsequent decoding at the receiver.

Now, suppose a second receiver, not part of the system, also detects the carrier and the "one-bit" or other modulation corresponding to the water level indication. If this second receiver has no previous knowledge of the significance of this signal, then it cannot be said that effective information (knowledge) has been conveyed.

The creation of information is thus inseparably bound up with the significance attributed to that information.

Returning to the reservoir as an example, calling within its environment, if an interface other than

the level sensor and its associated control system. One such interface is the input of water, such as rainfall and inflow from rivers. Water level may therefore be interpreted as a transformation of rainfall information, in the same way as a rain-gauge is used to indicate and measure rainfall. So where is information created? In the condensation process in the clouds?

The problem seems to boil down to the use of words. What information are we considering, rainfall or water-level? If the latter, then creation of the information is at the level-sensor; if the former, it can be argued that creation is in the clouds, or the meteorological system!

The question might seem to be rather pointless, but if it must be pursued, then the rules for determining creation of information must include a statement of what information we are talking about and a determination of where that particular information arises in the first place.

In these terms, the defined information can be created in a computer or in any other device. But we can attribute creation only if we define what information and its form (representation) we are considering. If, on the other hand, we wish to trace the source of information back through all its manifestations in the Universe, then we have an impossible task and in this case I would say the question is pointless!

P. S. T. BUCKERFIELD
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1984 and all that...

CONTRIBUTIONS from readers are welcome for our column of the strange things people say in the media about computers. We will pay £5 for each item we publish.

A warning prospect of a world ruled or enslaved by the magnetic band has been conjured up in Monty Carlo during the first international symposium devoted to computer security.

One example of this type of blackmail that could be achieved came from West Germany, where an operator had succeeded in stealing 22 megabits (measured only briefly, before handing over £250,000 ransom to recover the data, without which the company could not operate).

The Times

GOVERNMENT COMPUTER REQUIREMENTS

Future Central Computer and Telecommunications Agency estimates, released to the Government will appear in the OFFICIAL JOURNAL OF THE EUROPEAN ECONOMIC COMMUNITIES in the Supplement dealing with computer requirements.

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Survey of operators' salaries

WHILE I do not disagree with Paul Fisher's article (CW, January 22) it is important that the pertinent facts are revealed when salary surveys are compared. In his article he gives prevalence to a particular survey which is based on the result of enquiries in 132 companies. The Computer Users' Year Book salary survey is mentioned, but the fact that the survey covered operators in 1,433 computer installations is not revealed, nor is there any mention made that the CUYB analysis comprised 3,015 operators and 1,417 senior operators.

Although bigger does not necessarily mean better, it seems to me that your readers would be better served if the pertinent facts were revealed so that they could judge the credibility and value of a particular survey.

ROBERT GRANT
Editorial director
Computer Users' Year Book
Bournemouth

Search for a book

CAN any of your readers help me in my search for the book The Great Computer, by Alaf Johansson, originally published by Collins in 1968?

This book is out of print but if anybody has a copy which they would be willing to let me have I should be truly grateful.

STEVE SHIRLEY (Mrs)
F International
Church Street
Chesham, Bucks

Yet another set of symbols

CONCERNING Mr Atherton's article (CW, January 22), is it fair to introduce yet another set of symbols, and then call them "conventional"? The prospect is tempting, on the one hand, especially in education, self-serving. But is it justified?

Is it liable to influence the people who utter to the students? I don't mean their teachers, but their prospective employers?

If so, then it must be a good idea; but I remain to be convinced. This is not meant to be a "knocking", but a plea to be positive. The idea can be good, it must be practical.

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New ABS company bids for slice of handprint terminal market

A THIRD contender is now bidding for a share of the "handprint" terminal market pioneered by Quest Automation with its Datapad. The firm, CTS Recognition, is owned by small business systems manufacturer ABS Computers. Formerly called Allied Business Systems, ABS is owned by the Trafalgar House conglomerate.

The CTS terminal, called Telepad, employs a unique character sensing technique at Salford University under an ABS sponsorship. A coil inside the writing pen transmits a low frequency sine wave signal that is picked up by an electronic grid under the writing surface. As a character is written the grid generates a stream of X-Y co-ordinates for processing by character recognition software developed at Cranfield Institute of Technology.

He said that there were problems with "lag" in the resistive layers above that size on the Quest product.

Offering the same benefits over Quest terminals is the Data Tablet from Image Data of Bristol, the third contender in the handprint data entry market. The Data Tablet employs a pen with a magnetic flux generator, changing the flux being detected by electronics inside a three millimetre thick tablet. The technique was developed at Hatfield Polytechnic.

Touch-sensitive

Telepad and Data Tablet can both be supplied with a touch-sensitive keyboard for entering non-written characters and both offer the capability to digitise drawings. On the marketing side Quest has a big lead over its two competitors, having picked up customers all over the world, including the US. Image Data, which launched the Data Tablet just over a year ago, now has distributors in most European countries and also in the US, according to managing director Jimmy James.

John Beodall said that CTS was seeking distributors in Western Europe, but was not prepared to tackle the US market yet. He hoped that deliveries of Telepad would start in about three months, manufacturing being handled by the ABS factory at Brighton.

ABS managing director John Beodall said that his company had been looking for investment opportunities when it decided to back Telepad.

Development was helped by a £25,000 grant from the Department of Industry.

Private money line?

BRITISH Telecom could be allowed to borrow from private sources and above its Public Sector Borrowing Requirement limit under an amendment to the British Telecommunications Bill accepted by the government last week, during the committee stages of the Bill's parliamentary progress.

Such borrowing would require consent from the Department of Industry, which would take into account what the money was for. The scheme would also require approval from the Treasury.

The amendment would enable borrowing to take place without further legislation. In the Bill's second reading, Industry Secretary Sir Keith Joseph said he would like to see British Telecom invest about £2 billion during the year 1981-82.

British Telecom has welcomed the principle of the amendment, but a spokesman said detailed discussions would still be necessary after the Bill became enacted.

NEL

NEL Courses

Seminar on CAD/CAM systems in Mechanical Engineering, 1-2 April 1981.

This seminar, for technical staff involved with computers in the design and manufacture of engineering products and components, aims to provide an in-depth appreciation of several computer systems currently available.

The Design of Heat Transfer Plant by Personal Computer Systems, 8 April 1981.

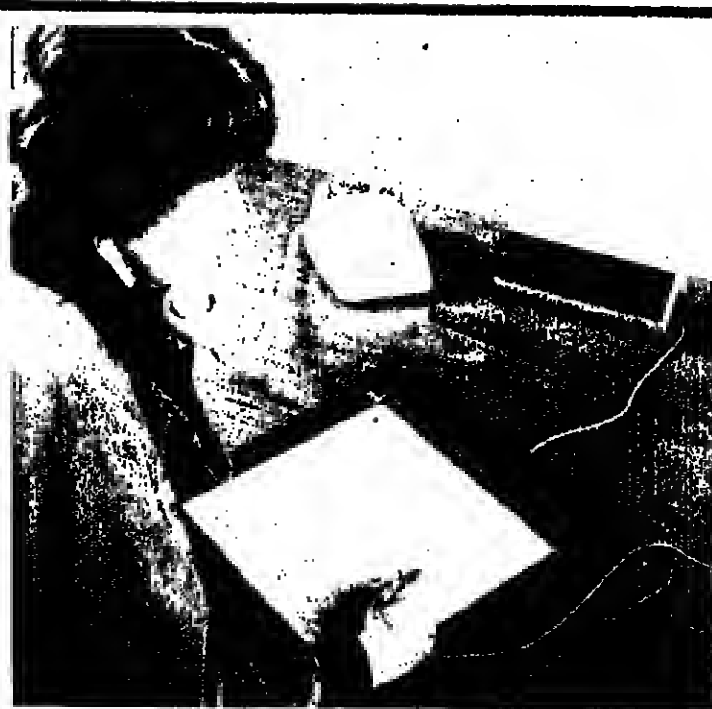
This course is intended to show manufacturers and users of heat-exchange equipment how they can take advantage of the latest developments in computer technology.

The Principles and Practice of Flow Measurement, 27 April-1 May 1981.

A course for engineers, plant designers, plant operators and anyone concerned with the purchase, use and calibration of flowmeters.

Further details on these events can be obtained from P. Collier, Conference Section, National Engineering Laboratory, East Kilbride, GLASGOW G75 0OU. Tel: East Kilbride 20222 ext. 433. Telex: 777888.

Telepad from CTS Recognition pictured right can be used to handprint characters directly into a mini or mainframe computer, a word processor or a communications system, including telex. It costs about £1,900 in single quantities and offers basic advantages over VDU data entry such as simultaneous generation of hard copy and much easier movement from one part of the document to another. Different format layouts can be held in the host computer and new ones can be generated by the Telepad user.

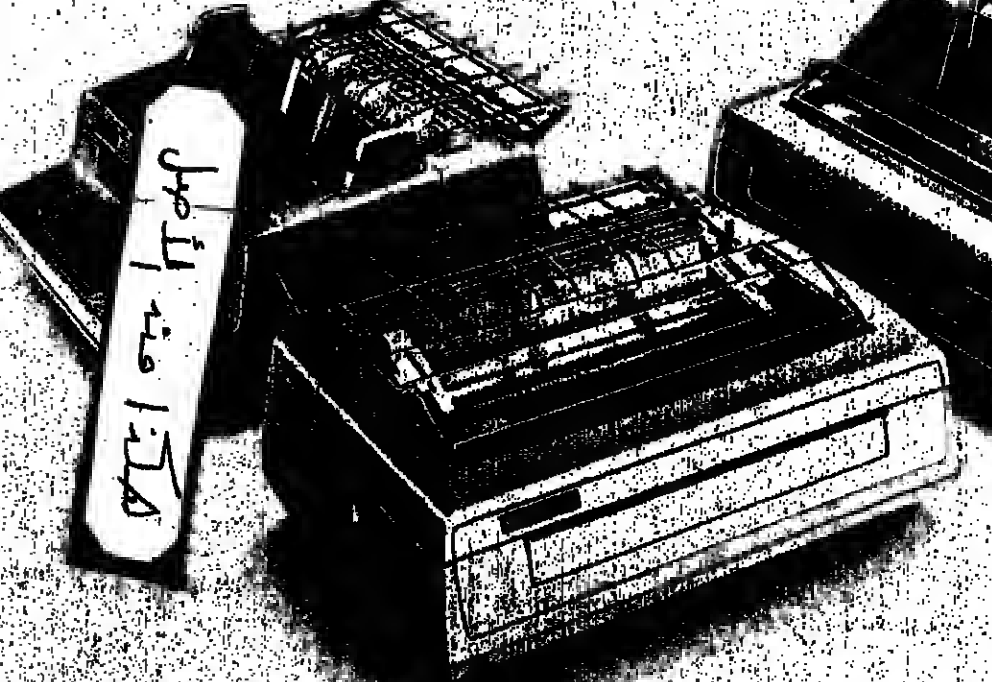


You have every reason in the world to switch to NEC's "thimble" printers. There are 128 of them.



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Thanks to our own LSI and microprocessor technology, the NEC Spinwriter Series 5500, which comes in three models, gives you camera-ready print quality. You can plot,



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Also, system modularity means your Series 5500 printer will grow as your requirements grow. And one of the nicest things about it all is that it really won't cost you a thing to switch. 7 interface capabilities, including those for Diablo, QUME and Centronics, means the NEC Spinwriter is ready to work in your system right away. Get close to our thimble printers now.

Texas cuts terminal prices

PRICE cuts averaging 15% have been announced by Texas Instruments for nearly all its data terminals and printers. They include a £200 reduction in the price of the 765 portable bubble memory terminal.

Exchange deal

CIT-Alcatel has concluded an agreement with Californian integrated circuits maker Semi Process Inc of Santa Clara under which they will exchange technological know-how. CIT will acquire 25% of SPI capital and the use of SPI technology.

NEC

Nippon Electric Co. Ltd.

1981-82

For more information, please contact:

NEC Telecommunications Europe Co., Ltd., NEC House, 150 Tottenham Court Road, London W1P 8LP. Tel: 01-368 8100. Telex: 28164.

Thames Systems Ltd, Thames Park Industrial Estate, Thames Valley Park, Uxbridge, Middlesex UB8 3PH. Tel: Thames (084 421) 6471.

Downtime

by Chad

Good old days of the 1980s

IN the good old days of the late Sixties, when data processing was young and so were we, the average working week in our industry was 80 hours, and the boss wouldn't pay overtime.

I fondly thought that such conditions had long since passed into the realms of myth and scholastic memories. Not so, not so at all. Don Martin, who runs the Sord Importer Exports from the beautiful Cornish resort of Penzance, called on Computer Weekly recently. Learning against the side of his car as he was leaving the office I noticed the mileage on the odometer. It was 67,000. Don told me that he had clocked up that score in the one year since he had started in the microcomputer business. And worked, as well. About a seven-day week, he said.

Why does he, and why did we,

and why do others go on doing it?

Because the computer industry is still a young and exciting place to be?

Or because all the myths about the laziness of the British worker and the incompetence of British management are as fictional as the infinite improbability drive?

Perhaps the truth lies in a curious direction, with boredom as one of the signposts. You see, boredom begets inertia and inertia, rather than laziness and incompetence, has always struck me as the prevailing problem in our industrial world.

Rushing from Penzance to Nottingham to Liverpool to deliver and install computer systems, or systems implementation, when all your best programs have to be rewritten in the middle of the night, is tough, but hardly boring.

Language barrier!

INFANT technology took on a new meaning at a recent Press conference demonstrating progress in speech synthesis.

The art of producing human speech by electronics alone is not the technology of tomorrow, we were told, but of the here and now.

To demonstrate the culmination of many years' work on the frontiers of science, there was a small doll. We waited anxiously for it to invite one of our party forward to be engaged in conversation, until our hearts thrilled to the request: "Please will you play with me?" spoken in a perfect American accent.

Later on in the demonstration, however, we were to discover that there are possibly still a few wrinkles to be ironed out before verbal communication between man and machine can reach its full potential.

The offending article was a coffee percolator which muffled its lines dreadfully. "Good morning, your tea is ready," it said, rather too confidently.

Good morning
Your Tea
is Ready



Intelligent machine

WE HAVE this clever IBM PRX in our building. It's so clever, it won't let me phone the test match scores, or Dial-a-Disc, or the Speaking Clock. We're not allowed to know what time it is. But what really annoys me is, if it's so clever, why can't it tell that the connection it has supposedly just made for me is giving me nothing but silence? It's like the footman who keeps his uniform spotlessly clean and drops the parcels down the drain.

The other advantage of this system is that when the operator throws the wrong switch at the end of the day, she cuts off all the phones and not just one or two.

Relying on buzz words

THIS recent and highly-charged debate at Cambridge University about whether structuralism is valid (or invalid) techniques for English teaching may appear as a million light years away from the more prosaic concerns of Computer Weekly readers.

There is a connection, though, however tenuous it may appear at first glance. How frequently have we heard that computer experts have debased the language of the English language, from the way luminaries who are now engaged in frenzied debate by the banks of the Cam?

For the non-fictionalists, structuralism (pace The Times) is a technique used in linguistic analysis which requires studying a text to see how language determines how an author writes. Perhaps it is not going too far to say that computer personnel are also influenced by the materials with which they work. Thus, buzz words become essential instead of the abstractions which self-styled preservers of the English language claim them to be.

GILB'S MYTHODOLOGY

Lost opportunities for automation

YOUR first reaction to a recommendation to "simplify by using more automation" might be that I am preaching to the converted, or, depending on your experiences, that we have enough problems with computer systems without creating more.

To the first group, the converted, I would say that we do not utilise nearly enough our opportunities for simplification by programmed means.

To the second group, those who are fed up with computers, I suggest that the fault is not automation, but rather a sloppy and amateurish application of it.

What kinds of things can we simplify by more automation? The major area of underdevelopment seems to be in data collection. In addition, we are missing opportunities in system and program testing methods, and in building-in help to systems users.

Lack of training

In the area of data collection, most system designers continue in ignorance, through lack of training, of the opportunities for automation. Most of them continue to design systems as if they had the technical constraints of electromechanical punched card systems. A detailed exposition of the technical opportunities available was presented in disc Humanised input book (Withtop), which detailed the opportunities we have for more powerful error detection logic, for automatic correction of human input error, and for variation tolerance of input.

For example, I recently worked with a large Scandinavian insurance company. One of their problems was in solving the two-week delay between changes in insurance policies by agents and the point where a company up-dated the record of the changes was available to the online databases. The solution was to look at the way in which the data was entered and integrated into the system, and to look at the way in which the data was used in the system. The automation opportunity had been identified in the data

collection area. Most of the delays were caused by mail being sent back and forth, queues of work at the central office, and central office quality control procedures — which usually resulted in a need to ask the agent to correct or complete some data.

What might seem obvious to some readers had not even been aired. It was to decentralise the data collection to the agent. At one extreme the agent could take a portable terminal on house calls, in the short term he could have one at his office or home. The procedure of mail transport, validation of data and keypunching could all be automated without bothering the central office staff.

In another case, a European airline had entangled itself in a 250 work-year project plan, unacceptable to management. Most of the effort was for centralising a database, but the major objectives were to reduce data collection staff by about 100 people for ticket fare data collection. They already had an online data entry system, so I suppose they did not think they could push things much further. On the other hand, most of the human effort seemed to go into encoding ticket information manually on forms.

Direct capture

The opportunity we grasped was direct capture online of the ticket information without any look-up of codes, and without any filling out of keypunching forms. This required a lot more programmed logic to take in the raw ticket data and convert it to the standardised format required by the reporting systems. But we proved it was possible to extract dry-run data on actual tickets.

The direct capture here was that the major management objectives could be met by a direct capture of the data, rather than the previously planned 250 work-years of manual data entry. The direct capture of the data was the key to the solution.

The trick was not only to attack the critical part of the system (where human effort was recently wasted on automatable tasks), but

to apply complicated programming to the input task. The programming is a one-time task of instructing the computer how to handle the ticket codes. However complex it is, it is easily saved when compared with hundreds of people working daily for years at the task which can be automated.

This is the opportunity which I find is all too frequently missed. We are too busy following our old traditions of simplifying input for machines. We don't see that the economics and machine capacity have changed. We don't see the opportunity we have to simplify the mindless encoding work by a little dash of automation.

Understanding

Automatic correction of human error is an additional lost simplification opportunity. Most programmers and designers have no idea that this can be done and most have never done it or seen it done. Incredibly in 1968-69 we designed a publisher system where nearly every data element that could be entered was capable of some degree of automatic correction (say 90%-95% of single character errors could be corrected without manual intervention). The logic for doing so was usually relatively simple to implement (the most complex algorithms were for automatic correction to names of

customers and author/title combinations — it could be done in 40 to 800 lines of Fortran depending on the sophistication wanted).

How many of you have large staffs and large delays because of validation and correction procedures which could have been simplified by automation? Too many is the answer, I fear.

How many of you still have great problems getting users to understand the system well, and yet you still rely on courses and handbooks to teach them, rather than an extensive built-in help on an as-needed basis? How many of you still rely on conventional program testing methods, and can hardly explain the automated tools such as deep file diagnosis programs, automated standards checkers, test path analysers, dual but distinct program code, automatic program structuring engines and comment assertion checkers? Not many, I know.

Yet these are some of the lost opportunities for automation to simplify the program test process. Automation can simplify, more than it present.

FOCUS

When 8m are jobless

THIS assistant director of the highly regarded Ashridge Management College, Jeremy Hall, has told the Institute of Marketing that the next 18 years will see unemployment rising to 8,000,000. The rapid development and introduction of the microchip is cast as the prime villain, aided and abetted by automation and low-cost electronically-controlled production systems.

Allowing for a tendency to confuse the microprocessor with a chip, the college does however offer some practical comfort. The new technology will offer the opportunity for creating new industries such as electronic games and home computing. Presumably at least some of the unemployed will be able to keep themselves amused.

Prospects

Hall offers no solution to unemployment except that, in the longer term, prospects look brighter as "youngsters are trained in new industries such as computer software programming". That this could lead to further microchip-created redundancies was not part of the projection.

The Ashridge report is but one of a series of dire warnings on the consequences of microchip technology. Well known for its management consultancy services, Fieldrick and Struggles, which employs some 100 search consultants, has just compiled a top UK management computer industry report which shows that 60% of chief executives of large companies anticipate radical change, and the biggest to this change is the impact of the electronic office, communications and falling microchip costs.

Think big

The report also suggests that increased competition and increased working capital requirements could lead to the business failure of many smaller firms and the failure

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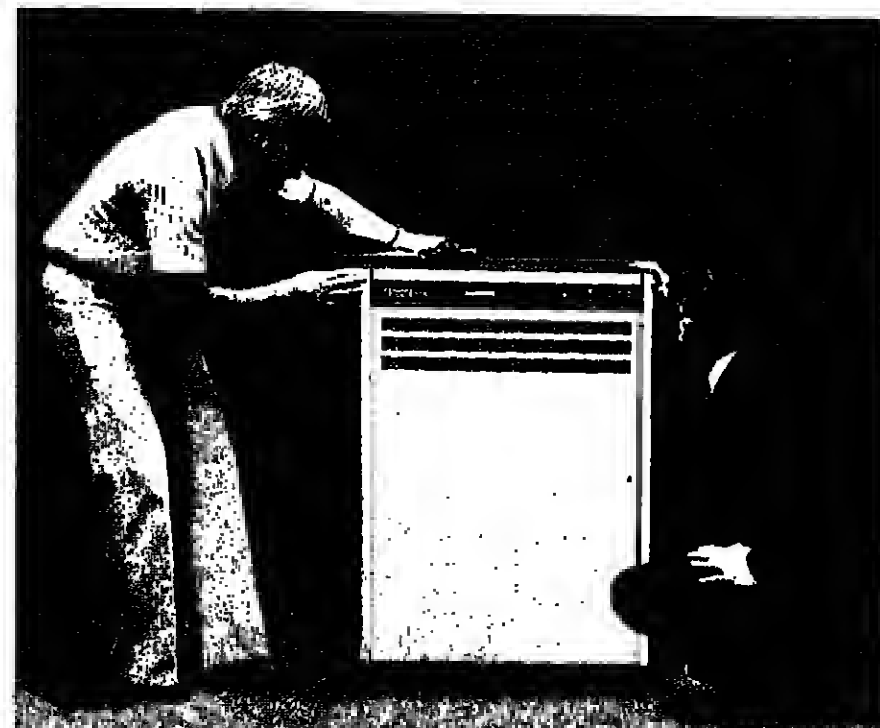
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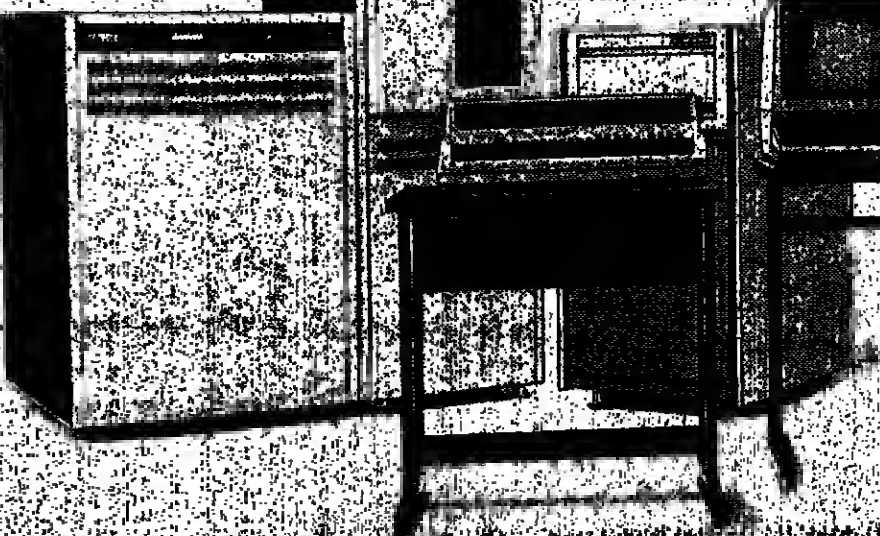
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Sir Keith rejects plan for a CAD Institute

by Eileen Stainer
THE Department of Industry has rejected a recommendation from ACARD, the Cabinet's Advisory Council for Applied Research and Development, for a Computer Aided Engineering Institute.

In its most recent study on computer aided design and computer aided management (CAD/CAM) a year ago, ACARD suggested that the advisory and bureau services provided by the National Engineering Laboratory and the work on software development by the Computer Aided Design Centre should be co-ordinated into a single organisation or institute.

In its response the DoI has agreed that there is a need to increase collaboration between the

NEL and the CAD/C, but not on a complete basis, as the NEL has interests in other research and development work, like automated small batch production.

The DoI has also rejected the recommendation that both the NEL and the CAD/C should be moved to a more central place than East Kilbride and Cambridge respectively.

Location near universities and industries is rated by the DoI as a higher priority than accessibility. In its report ACARD suggested that the DoI should take responsibility for producing and disseminating information on the subject through courses and seminars. It indicated that the Department should take advice on this from its

successful microelectronics awareness programme.

The DoI has accepted these two points and emphasised that it is already trying other schemes to improve awareness. Money to provide this awareness would come from an increasing proportion of its science and technology budget.

ACARD's plan of maintaining a close watch on overseas developments was also accepted, although the Department already has close links with science counsellors in Bonn, Paris, Washington, Tokyo and Moscow.

ACARD made five recommendations concerned with education at all levels. One was that computing should be given more emphasis in schools; another that

undergraduate courses in engineering should include the use of CAD systems.

The other three involved re-training schemes for existing staff and managers, including post-graduates.

In response the DoI has indicated that the whole area of engineering education is being examined by the government because of the findings of the controversial Finiston report. Computer studies and CAD are limited by a shortage of trained teachers, staff and equipment.

Universities and polytechnics, with the help of the Science Research Council, are launching five new courses in computer aided circuit design.



Sir Keith Joseph

GaAs integrated circuit market expected to 'take off' this year

THE Gallium Arsenide integrated circuits market is expected to take off at the end of this year, according to a study by US market research company Strategic Business Services. And for the first time the US manufacturers will not be leading the field.

Analogous chips such as amplifiers, modulators and multiplexers will appear first, with digital ICs appearing during 1983, says the report. The main markets will be in telecommunications, data processing, military and instrumentation.

US manufacturers have upped mainly for the less fruitful military market, while Europe and Japan have gone more for the large volume commercial markets like satellite television.

Europe and Japan will be

contenders for the leading position. In the UK, GEC expects to produce custom devices using GaAs technology in a few years time. Research and development being carried out at the ICL Research Centre.

According to the report, a world market should reach \$1 billion by 1990 if no unforeseen technological problems arise before then.

The report, which is titled "Impact of GaAs on MOS", says that the world market for GaAs integrated circuits will reach \$100 billion. It has been estimated that in 1979 there were \$1 billion worth of ICs being sold worldwide.

Second private firm may move into satcom

ANOTHER private company has followed GEC's lead in announcing its ambition to run satellite-based communications services. The company, Air Call, currently provides a radio-paging service.

Walter Stevenson, a director, says that the company's business is message and data handling, and that to offer broadband transmission services - such as facsimile, data and television - would be a natural extension to its existing service.

Such services could use satellite or microwave networks provided by private industry; or they could be based on British Telecom's networks, as value-added services, if the Department of Industry decides to allow this after studying Professor Michael Heslop's report, which was delivered last month.

Private industry has been encouraged to think in terms of providing new communications services, not just because Sir Keith Joseph has been talking about liberalising British Telecom's monopoly since before the present government came to power.

because industry Minister John Marshall has been visiting companies to ask their views on possible new services from the Sir Keith's statement in the Commons last July.

Stevenson points to Sir Keith's remarks about specialised microwave and point-to-point services and says there would be point in putting through a British Telecom communications bill at the end of the day to be granted.

Air Call is not finalising its plans in advance of the passing of a bill, but one possibility is a consortium of companies providing services via about 50 shared stations in the UK. A limited service could be started before the end of the year (given that the bill is passed and the DoI approves a plan), based on the existing Telecommunications Act. British Telecom also plans to use for commercial trials.

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Fortronic on verge of exclusive European marketing deal with ICL

by Keith Jones
BANK terminal manufacturer Fortronic of Fife is currently negotiating an agreement with ICL that will extend the latter's marketing rights of Fortronic's kit to a worldwide basis. Last year, the two firms signed a deal covering the UK and Ireland.

Fortronic marketing director Bill Archibald said that the deal might exclude the US, where ICL's presence was limited, but European countries like France, where ICL is a major force, plus Spain, Portugal and Switzerland were seen as very promising.

Archibald added, "We need firm assurances from ICL of business we can get out of the agreement before we sign."

CMOS memory with battery back-up to avoid losing balances.

Another role for the TTS is that of a controller for a cash dispenser manufactured by De la Rue. Besides being sold in this guise within the UK to banks like the Midland and Yorkshire Bank, it has already found its way into the branches of several of De la Rue's continental banking customers.

Bill Archibald said that De la Rue assisted him to contact key data processing people in the banks he visited and that "magnificent assistance" was also provided by the British Overseas Trade Board before he started his tour.

Unlike the UK, where the banking market consists of a handful of very large prospective customers, the number of banks on the Continent is far greater and the risks involved in bidding for any one contract are often far less.

Spain alone has 350 banks, and is seen by Archibald as a very promising market, along with Portugal and Switzerland, for the foreign exchange system.

All three could follow the lead of customers in the British Isles who have opted for the product, like Barclays with 450 terminals, the Bank of Ireland with 100 and National Westminster which has just 25 at the moment.

Archibald spent much time on his tour simply standing in bank branches observing procedures for dealing with customers. Cities visited were Madrid, Barcelona, Geneva, Zurich, Salzburg, Bern and Paris, and Belgium and Holland were covered later by a colleague.

West Germany was missed out because, according to Archibald, decisions have already been made there about replacements for existing terminal equipment.

But he expects between 2,000 and 2,500 Fortronic terminals a year to be installed on the Continent over the next few years, most of them probably by ICL and with ICL providing customer support.

Archibald quoted the study published last year by consultants Pactel, which forecast a potential market of 300,000 units for the kind of equipment built by Fortronic.

He also predicted that Fortronic would manufacture about a third of the 40,000 terminals that Pactel expects UK banks to order over the next 10 years.

Fortronic's main competitors will be companies that are many times bigger like IBM, Burroughs, NCR, Philips and Nixdorf. With turnover of around £3½ million over the last year, Fortronic is a minor player in comparison.

The majority of its equity is now held by a group of London investment trusts which have provided the company with the credibility

and stability needed to do business with the banking industry.

Fortronic's UK policy is to leave marketing of its kit largely to ICL but to provide customers with first-line support to avoid losing touch with them.

The Fortronic kit at the Clydesdale Bank has eliminated the requirement for pay-in slips and also for a cheque when a customer is drawing on his own account at any Clydesdale branch.

Fortranic marketing manager Bill Archibald with the Transaction Terminal System. He demonstrated it to prospective banking customers in France, Spain, Switzerland and Austria late last year in its foreign exchange role. He also assessed what facilities Continental customers might require on the F55, the successor to the TTS which has yet to be formally launched. About 1,000 F55s are to be installed by Barclays Bank as counter terminals.

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Fortranic marketing manager Bill Archibald with the Transaction Terminal System. He demonstrated it to prospective banking customers in France, Spain, Switzerland and Austria late last year

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ICL shares crash on news of £20 million loss

FOLLOWING the chairman's announcement that the company had made a £20 million loss in the first quarter of the current financial year, ICL shares crashed in 24 hours from 46p to 32p. By last Friday (February 6) they had rallied to 37p.

The collapse seems to have been centred on market fears, whether justified or not, about the company's borrowing.

Debt at the ICL group rose from £15.4 million in 1979 to £44.5 million in 1980. Long term debt rose from £99 million to £116.8 million. ICL paid a grand total of £26.3

million interest on these debts, amounting to more than half the trading profit of £51.4 million.

The chairman declined to answer in detail questions at the annual meeting about the company's cash flow. However a detailed look at the effect of an overall loss of £35 million - a figure implied by Philip Chappell when he predicted a reduction in the loss for the second quarter and break-even for the second half of the year - shows the following.

The overall cash outflow for 1980, taking the leasing subsidiaries into account, approached £100 million. According to the chairman the cash outflow in the first quarter was held at last year's level. On an averaging basis this implies an outflow of £25 million per quarter, or £100 million for the year as a whole. That would take the ICL group's total debt to over £250 million.

At current interest rates of 14%,

the cost of those loans will be about £35 million, or less if MLR comes down.

This kind of loss could be sustained by a company for a short period, but the ending of the recession, upon which Chappell places so much emphasis for ICL's recovery, would add to the drain on cash as the debtors ledger total rose.

There are other considerations. The quarter in which ICL made the loss has been uniformly reported by American and international companies as very difficult. The coming quarter, according to many company chairmen, looks little better.

Recovery in Britain on the other hand, with the economy so deeply in recession, could be swift.

A reversal of the government's moratorium on the 1900 replacements, taken with an early placing of specific orders for the PAYE contract, would have swift and immediate impact on ICL.

With Mrs Thatcher determined

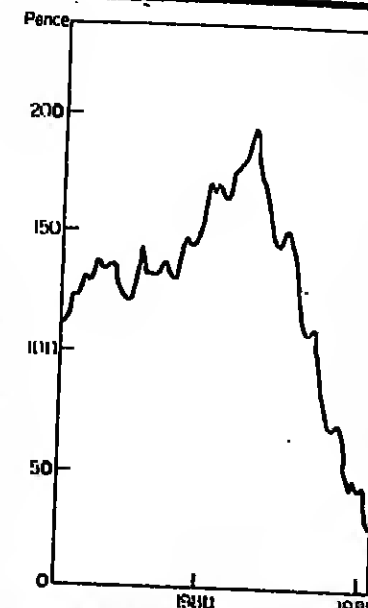
to be as non-interventionist as possible, this is the most likely way for the government to help ICL.

Barclay's Bank, one of ICL's main creditors, issued the following statement, with ICL's agreement, immediately after the annual meeting: "We are well aware of the problems the company faces because of the current difficult trading circumstances, as we are aware of the chairman's statement made at the extraordinary general meeting.

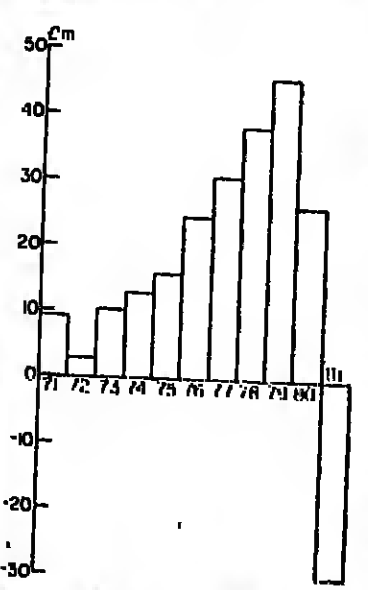
"We, along with the company's other banks, are being kept fully informed so that we can respond appropriately as the company's plans to surmount its difficulties develop.

"For the time being we are satisfied that ICL has adequate unused short term borrowing facilities at its disposal."

Barclays insists that the statement should not be interpreted as a request to ICL to make its recovery plan more specific.



ICL share price movement, 1980/81.



ICL's profits 1972/81. The figure for 1981 is based on the chairman's estimate of a £20 million-plus loss in the first quarter, a reduction of this loss in the second quarter, and break-even for the second half of the year.

PM hints at tax reliefs

FURTHER hints on the likely shape of small-company tax concessions have emerged from a reception at 10 Downing Street.

Mrs Thatcher told 40 investors who attended the event that the government wanted to help, not hinder, the growth of small high

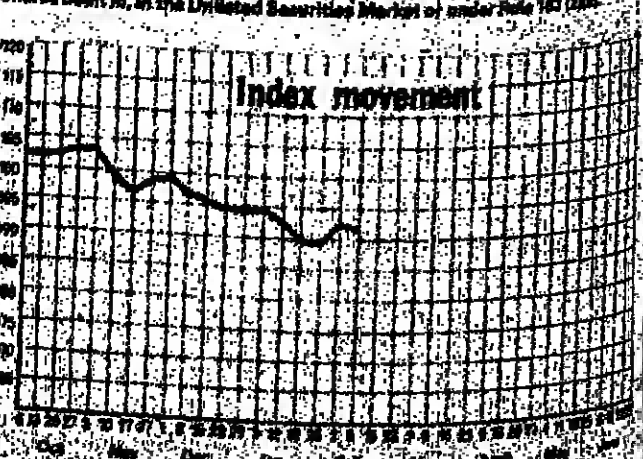
technology companies.

A report prepared by the Inland Revenue for the Treasury, which sets out the government's policy on small company tax credits for investors and the losses in small firms being able against income tax.

CW SHARES TABLE

Price	London Stock Exchange	Price	Index	Price	Index
100	100	100	100	100	100
101	101	101	101	101	101
102	102	102	102	102	102
103	103	103	103	103	103
104	104	104	104	104	104
105	105	105	105	105	105
106	106	106	106	106	106
107	107	107	107	107	107
108	108	108	108	108	108
109	109	109	109	109	109
110	110	110	110	110	110
111	111	111	111	111	111
112	112	112	112	112	112
113	113	113	113	113	113
114	114	114	114	114	114
115	115	115	115	115	115
116	116	116	116	116	116
117	117	117	117	117	117
118	118	118	118	118	118
119	119	119	119	119	119
120	120	120	120	120	120

The table shows the closing prices in London on Friday and in America on Thursday. The share index is based on the prices of the UK companies in the table. Shares dealt in, in the United States are shown in italics.



Northern Telecom £78m loss

NORTHERN Telecom, the Canadian telecommunications manufacturer, reported a loss of £78.8 million on turnover of £876 million in 1980. This compares with a profit of £24.2 million in 1979.

Much of the loss was made by the company in its subsidiary write-down of £69.7 million in the fourth quarter last year, in respect of the operations of the Canadian Telecommunications Corp of Minneapolis. The subsidiary consists largely of a Sycor Inc and Data Inc, which Northern Telecom bought in 1978.

The purchase was an attempt by the parent company to broaden

All foreign companies made a loss in 1980. In the case of Northern Telecom, the loss was due to the write-down of the Canadian Telecommunications Corp of Minneapolis. The subsidiary consists largely of a Sycor Inc and Data Inc, which Northern Telecom bought in 1978.

its role as a major supplier to Canada and Northern Telecom was swiftly hit by problems which it could not cope with its existing lines. Problems at NTSC were much less than anticipated and the subsidiary failed to hold on to its managers they had signed with the Dais 100 and Sycor.

Northern Telecom's chief executive, Walter Light, said he was cautiously optimistic about 1981, but added that the electronics office had systems would continue to be money.

AT&T rings up £2.58 billion profits

AMERICAN Telephone and Telegraph, owners of the Bell Telephone System in the US and a major force in the growing field of data networks and transmission, has announced higher turnover and revenues for the year just ended.

Turnover rose to £21.5 billion, from £19.3 billion in 1979. Profits rose from £2.4 billion in 1979 to £2.58 billion in 1980.

AT&T is the biggest telephone company in the US. Hints have appeared that the company

will shortly settle its long-running case with the US Justice Department, which is seeking to divest AT&T of its telephone subsidiary, on the grounds of alleged anti-trust activities.

With the explosive growth predicted for telecommunications AT&T is more than anxious not to lose its potentially most profitable division.

The Carter Administration's Communication Bill, which was aimed at the problems caused by converging technology, such as AT&T's

cross-subsidising of its data processing and transmission services, and was intended to promote competition, now faces an uncertain fate in the new Congress.

AT&T last year spent £7.3 billion on construction and investment in new communications facilities and is obviously anxious to see the anti-trust suit settled. No doubt it hopes that the Communications Bill will, like the Administration which drew it up, fade quietly into oblivion.

CII-HB calls for £82m for ambitious launch into office machines

FRENCH computer giant CII-Honeywell Bull increased turnover by 22.7 per cent last year to achieve a final total of £569.5 million, of which 43.3 per cent was represented by exports, chairman Jean-Pierre Brulé announced in Paris last week.

Brulé said: "1980 was not easy because we had to cope with high demand and manufacturing problems. In spite of a big challenge I am confident we will have a good result in 1981 although the first quarter will mean a difficult start."

Profits for 1980 totalled £16.4 million, an increase of 60 per cent over 1979 when government subsidies for the two years are discounted. In 1979 the company received £10m and in 1980 £1.9m from the government.

CII-Honeywell Bull, which has now reached the end of a four-year period of development with generous government aid, is asking for another spell of assistance accompanied by new fund-raising ventures on the international money market.

Investment

The French computer maker needs £82 million to launch an ambitious new programme of computers and office machines.

CII-HB created 1,213 new jobs last year and invested £127 million.

But the French company still lacks the firm foundations of the

EEC takes an interest in small companies

IN a paper on small companies in Europe, the EEC Commission notes the substantial contribution made to the gross national product of various member states by small firms. The contribution was put at between 30% and 60% of total GNP.

The Commission has recommended to the Council of Ministers that the EEC should take a positive interest in the development of small firms. The recommendation was made on the basis that "with the development of the new technologies, small and medium sized enterprises will prove forerunners of the eventual structures of industry as a whole."

The report goes on to note some of the measures taken to help small businesses in the EEC. Efforts have been made to simplify Customs procedure and a Business Co-operation Centre has been set up at Rue Archimède in Brussels. The object of the BCC is to put small firms in touch with each other and with potential markets for their products. The BCC has been in existence for seven years and is rated one of the EEC's more successful ventures.

In terms of support for new technologies and innovation, the general trend has been to recommend that member governments give tax concessions to entrepreneurs in the high technologies, also direct and indirect financial subsidies, advice and help in managerial and technical training.

Events in the UK are overtaking the Commission's paper, which merely noted that a scheme had been launched by the Trustee Savings Bank to help small companies.

The Budget, on March 10 seems destined to let loose a flood of privileged loans and funds to anyone willing to set up as a small computer company.

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The Greater Manchester Police have a computerisation project extending through the 1980's. The first major operational phase, due to be commissioned on 1983, will be a criminal records system serving both headquarters and outlying sub-divisions by means of a data network; a message switching system is also included in the phase. (Later developments will include command and control and street index applications. There will also be a number of administrative systems).

Suppliers of substance who have considerable experience of Police or Defence contracts of the type outlined above and who wish to be considered for the phase should write to:

The Chief Constable, Greater Manchester Police, Computer Project Branch, Pockley Park Training School, Prestwich, Manchester M25 6JT.

to arrive no later than Friday, 20th February, 1981.

Only written responses to this advertisement will receive consideration.

Chief Superintendent Rankin 061-798 4857 ext 50

Companies Bill will cut paperwork

THE new Companies Bill, published by the government last week, seems set to remove some of the worst paperwork burdens facing small firms, particularly those in the computer industry.

Small companies defined in the Bill as having a turnover of less than £1.4 million and a balance sheet total of less than £700,000, will have to file only an abridged balance sheet with the Registrar of Companies. They will not have to file a profit and loss account or a directors' report although share-

holders will retain their entitlement to a full set of accounts.

The Bill also proposes the abolition of the registry of business names. Although this is seen as a help to small companies, the measure is primarily designed to save money for the government. Credit agencies and others have registered a strong protest with the government over this element of the Bill.

Magistrates are given the power to disqualify anyone from operating a company if convicted of fraud.

MCS wins £280,000 order

WAREHOUSE stock control and order processing are the two main applications for a Digital Equipment PDP-11/70 system ordered by the supplies department of Kent County Council from Management Control Systems.

The contract is worth £280,000 to Management Control Systems and was won in competition with

IBM and ICL. The 11/70 will handle some of the work currently processed on Kent's ICL 2900 mainframe system and is the first DEC commercial system to be installed by a local authority in the UK, according to MCS.

The 11/70 is to be installed at West Malling, Kent, and will control a warehouse.



BRULÉ... "The first quarter of 1981 will mean a difficult start."

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MPS 5021 - one of a new generation of microprocessor-controlled modems for full duplex asynchronous operation up to 300 bit/s over 2-wire dial-up or leased circuits. Fully V21 compliant.

ALD-1 - an asynchronous line driver providing short-haul, point-to-point operations over twisted-pair cables at speeds up to 8000 bit/s.

SLD-1 - a synchronous line driver for short-haul, point-to-point or multipoint use at speeds up to 19,200 bit/s over twisted-pair cables.

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To give you an even greater choice, each one is available in two versions: with its single p.c.b. card housed in a table-top case, or in our high density 18" rack-mounting card nest giving a total modem intermix capability.

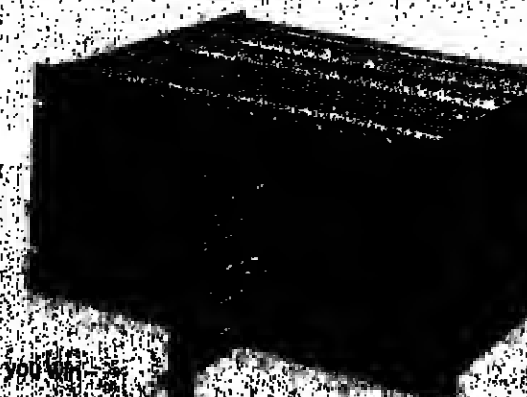
And we've one more ace up our sleeve: LS1 2401 - a 2400 bit/s V28 compliant modem for synchronous point-to-point or multipoint operation over leased lines. It is also available either in table-top form or as a vertical card for high-density central site packaging.

So, whichever way you choose to play your cards, you win with Racal-Milgo.

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Greg Hayes and his TRS 80 microcomputer. But what's a systems programmer and a small machine doing on a page for operators? See story below.

Emulating experience

A PROBLEM about training operators, or for any job which is essentially practical, is that people can't be expected to learn the tricks of the trade without actually doing them. It is expensive and difficult to initiate trainee operators, or trainee airline pilots, to that, by carting DC 10s and IBM 360s into the classroom. The alternative — on-the-job training — is also expensive and potentially disastrous.

One solution is the provision of some kind of emulator. Greg Hayes, pictured above with his TRS 80 microcomputer, was commissioned by Malcolm Fry to prepare an operators' emulator. Fry wants the emulator for the newly-formed Protocol Operations education outfit and it will be demonstrated at the first event today, February 12, at the Coburg Hotel in London.

"It's overrating the case," says Hayes, "to call it an emulator. What happens is that if the student

responds correctly to a prompt, the TRS80 emulates a Power VS console."

The micro is designed to reinforce the lessons that beginners learn in the classroom. It uses a keyboard miles away from any mainframe. What the student sees is a split-screen, in the top two-thirds acting as a Power console with the remainder given over to student information.

Three attempts

The present course demands that 24 Power VS prompts are learned so that the commands can be keyed in by the student. A handout asks: "DISPLAY THE PAYROLL PRINT ON THE QUEBEC" to which the student should respond by keying in "D LST, sp". The student is allowed three attempts and the correct response is shown on the screen after the third wrong attempt.

Having completed the 24 questions, the student is given a piece of printout which details the following: Course name, date, student name, question number, attempts made, whether the student made a correct response, and the answer. The answers can be lined up against the questions for future reference.

Hayes prepared most of the teaching program in Basic and went into Assembly for scrolling the upper part of the screen. He built it around four files for the questions, the correct answers, the student file and the emulated responses.

Hayes is well suited to bring the micro to the mainframe. He spends his days at an IBM 3278 terminal working as a self-employed systems programmer, and for relaxation he works on his TRS80. After his BSc in electronics at Kingston Poly he spent a year as an operator.

Now everyone wants to be called 'manager'

JOB titles seem to be proliferating faster than fall-out shelters these days.

The 1975 Computer Users' Year Book listed four operations categories: Manager; chief operator; shift leader; computer operator; junior operator. Five years on and the list has inflated to include three more categories: Senior operator; telecommunications operator; job scheduler. (Incidentally in 1974 the median salary range for ops was £1,500 to £1,750.

Categories

According to the Auerbach survey, American ops can fall into one of six categories. "The levels," it says, "have been identified statistically by performing a frequency distribution on the actual salaries paid all people within a particular group and determining how many modes (bell shaped curves) occur in the distribution. This establishes how many levels of skill/responsibility the marketplace recognises, as evidenced by actual practice."

Levels A and B in Table I are operator grades which are minutely distinguished in the pecking order. An A is "usually competent to work independently in most places and requires only some general direction." B is "usually fairly competent to work on several phases of the activities with only general directions."

Levels C and D are operator grades which are minutely distinguished in the pecking order. An A is "usually competent to work independently in most places and requires only some general direction." B is "usually fairly competent to work on several phases of the activities with only general directions."

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assistants managers out of his minious. Company policy dictated that he be called superintendent of computer operations.

But operations is not the only part of DP to have created more roles for itself. To return to the older, thinner, copy of CUYB is to go to the days when 17 job titles could cope with any mainframe. By 1980, 23 categories were necessary.

More job titles mean an increasing sense of importance which is also reflected in the ways American mainframe big-wigs have christened themselves through the years.

The machine accounting manager was top of the pile in the early 1950s but had evolved into a manager of computer operations by 1960. A decade passed and the life form was starting the ascent to boardroom heights with the title of manager of data processing. There was no way that a mere machine accounting manager could luxuriate at a seat on the board, but current US computer headlines belong there as vice-presidents. Junior, senior, junior-senior and senior-junior vice-presidents are strange, tightly-suited creatures given to laughing at jokes which aren't funny at all. They are, however, in no imminent danger of extinction.

Managers are now necessary

where technicians used to rule. Computers are more important in the latest CUYB the machine account services manager is introduced. "He would be likely," it says, "to be regarded as clearly so if his title is a management services director or a higher status and a more significant role."

Ops managers range from machine minders to the machine director's golfing partner. In his installations the job titles suggest all chiefs and no Indians. But why not? Nearly everyone wants to be dubbed a manager.

Newspapers are just as keen as the computer world to use the term "editor" somewhere in their job titles.

Etiquette

These things are important though. "What do you do?" is a question often asked. The large title might like to ask all sorts of things about religion, politics, salary etc.

Etiquette forces the language to wait, but no social graces stopped the question, "What's your?"

It's pleasant to have an appropriate answer.

US JOB TITLE	AVERAGE ANNUAL SALARY	STERLING EQUIVALENT (\$2.35/£)	UK JOB TITLE	MEDIAN ANNUAL SALARY
Supervisor/manager	\$23,900	£10,170	Operations manager	£7445
Lead	\$17,800	£7575	Chief operator	£3475
Senior	\$15,300	£6510	Shift leader	£3031
A	\$13,200	£5,617	operator	£2,110
B	\$12,000	£5,108		
Trainee	\$10,400	£4,425		

TABLE 1: A comparison of 1980 US and UK operations staff salaries with American figures courtesy of Auerbach Publishers, UK numbers based on Computer Users' Year Book.

How UK and US ops' salaries compare

SURVEYS, statistics and other generalisations are always useful in an argument. It's reassuring to know what Joe Average and Sue Median are being paid, even if you are certain they don't exist.

Such was the interest in the pay figures published in Op Spot a few weeks ago, that I have dug up a few more. The table below is from Auerbach's Salary Trends in DP Operations and from the 1979 Computer Users' Year Book.

A couple of points should be made: Firstly, the UK salary figures include regular overtime and shift premiums where appropriate. Secondly, the US salary figures are averages and salary averages tend to be distorted by the occasional exceptionally high salary. Assuming that the sources

are good, median figures are more realistic. Other than that, the figures they say, speak for themselves and there seems to be very little for median UK operators to be envious of their average US counterparts.

Manufacturers pay more

DID you know that in America manufacturing firms pay ops more than service firms? Capital intensive firms pay more than labour intensive firms and the US banks tend to pay fringe benefits richer than others.

Invitational Computer Conferences

A SERIES of invitational computer conferences are being organised by the European Computer Manufacturers Association (ECMA) in Europe. Called Invitational Conferences, they are designed to be the equivalent of the quality

There will be a programme of technical papers and demonstrations, a display and demonstration by 30 top manufacturers, 100 top executives, and a reception in London on the evening of the conference.

PROGRAMMERS' PAGE

The next decade will witness a computerised revolution within the home — a fact discovered by PAMELA ROWE during her visit to the Microelectronics Come Home Exhibition at the Design Centre in London. The silicon chip stands poised to undertake or render painless domestic tasks.

"CHIPS with Everything" entered common parlance in the sixties with Arnold Weaker's play. In the Seventies it took on a double meaning with the advent of the silicon age.

We have been promised great changes in the next ten years — which most of us anticipate with a fission of enjoyment — through its invasion of every facet of life.

The familiar forecast is increased leisure for everyone and new styles of working life. Silicon chips have already made inroads into some areas — cars built by robots, computerised accounting and automated stock-taking; but its impact on the home has yet to be realised in full.

An exhibition winking out the chips scattered around the average semi is now being held at the Design Centre, London, until March 7 and then at the Glasgow Design Centre from March 30 to May 30.

"Microelectronics Come Home" concentrates on the way British designers and manufacturers are introducing new technology into everyday products.

Each room in the family home is investigated and with the constant tinkling of the variable door chimes as background muzak, they can be programmed for an endless permutation of notes. Gaining access to the micro-electronic house isn't all that easy when it is protected by an automa-

ted burglar alarm. The Yale Diplomat system consists of a control unit, three magnetic switches for doors and windows, and a pressure pad.

It can be self-installed and allows 25 seconds after setting to leave the house, or the same time to reset if you've accidentally tripped the alarm, before a high-frequency warbling siren is let loose.

Tucked in a hall cupboard you could find "Mole", a vacuum cleaner robot designed by J. McCormick at the North Staffs Poly.

This non-burrowing Mole contains a micro and memory chip; once this invaluable ally has "done" a room, it never forgets and can reproduce the whole sequence of movements.

With sensors to detect alien objects, it steers around the furniture and there's no need even to move the cat sitting on the mat.

It is perhaps in the living room that the chip has had most effect. Besides the obligatory digital watch and calculator per person, Intelligent Chess lies on a table awaiting its next challenger, who or which may be beginner, expert, or schizophrenically, itself.

Moves are shown either on the digital display, or if linked to a TV, on the screen. IC makes one million operations per second checking the legality of your moves and pointing out the strengths and weaknesses of your

game.

Your resultant curses can be recorded for posterity or later penitence, and pre-recorded cassettes played on the television for non-stop chess — if the family will let you.

When this falls, the Home Entertainment Centre offers 14 TV games including Combat, Maze, Horse Racing, Motor Racing and Master Mind, the latter going supersonic to become a game on its own.

Instead of manual four-coloured pegs, a sequence of six numbers gives a possible million permutations and is stored on a chip.

One person or many may play and you can race time to beat the clock. Again you are judged audibly, with a buzzer for failure and a beep when you win. No hope of hiding the buzz of failure.

The Study is more serious. The British Telecom videodata system Prestel dominates the desk, a ZX80 may hold the household accounts and an X-Press Callmaker telephone functions either as phone or aide.

It stands ready to store up to 10

Chips with everything on the domestic scene

by Pamela Rowe

numbers in its memory, any of which may be dialled by pressing just two buttons.

If there's a gambling man in the house, Genie may rub shoulders with a lamp or two in the corner enabling him to work out his losses. It is a single chip micro for calculating the winnings from complex racing bets.

Previously, this was the sole province of highly-trained professional "setters", but even inexperienced staff or punters can use Genie to summon up the magic numbers.

From the sublime to the ridiculous, the workaday world of the kitchen is not forgotten: it comes complete with the usual offices of a built-in Couture de Luxe Wall Oven with computerised timer and Creds 1000 RS Electronic washing machine with nine programs and

no electromechanical parts to break down.

The Sensamule tumble dryer capitalises rather cleverly on the fact that exhaust air temperature remains steady while the washing is wet but shoots up as soon as it begins to dry.

The general temperature is maintained by a self-learning Central Heating Controller, which teaches itself to save your fuel bill. Hot water and room temperature are controlled separately.

The chip has become more ornamental in the bedroom with flashing electronic jewellery winking out messages or colours.

A pocket TV sits on the bedside table and is just the right normal reading distance away for its 2in screen to give a bright sharp picture.



CHIEF OPERATOR BHI Jones instructs Alden Vase, 18, of Runcorn, on an IBM 4331. She is one of the students on a 14-week Youth Opportunities Course at KBS Computer Services, Liverpool, which hopefully will improve her chances of employment in an area where 4,700 school-leavers chase only 12 jobs.

Puzzler

THIS week's problem is to formulate a Magic Square, using the consecutive series 1 to 25 in such a way that all the shaded cells are occupied by Prime numbers. The even Prime 2 must be situated as shown, so that leaves 3, 5, 7, 11, 13, 17, 19 and 23 to be sorted out.

As usual with this type of square, all five rows-of-five figures, all five columns-of-five figures, and the two long diagonals, must each sum to the same total. See page 46 for solution.

RAIR

Terminal Choice

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LA34 DECWRITER
30 cps. desktop terminal with variable character and line spacings, adjustable margins and horizontal tabs.

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VT100 DECSCOPE
80/132 column VDU with detachable keyboard, smooth scrolling, split-screen, and video input/output.

RAIR 30-32 Neal Street, London WC2 Tel 01-836 4663

Get your ears on, Good Buddies...

Cos CB World is your kind of mag. It's for breakers by breakers and it's already one issue old. Now we're into our February/March number and we've packed it with the sort of stuff you need to know. Like: Should Smokey have CB? Handles for towns, Cber's Handles, and CB slang for Brit breakers. There's a full test report on a popular Midland rig and photos and specifications of other rigs in the Midland range. Plus readers' letters, details of CB clubs all over the U.K., a full colour spread of British-owned trucks and our special CB cap and T-shirt offer. Burn some rubber to the paper shop and eyeball a copy now. Tomorrow may be too late.



COMING ON WALL TO WALL

February/March number selling now 50p

Omnidata names management team

THE UK company formed to market the Omnidata range of combined data and word processing systems, Omnidata Ltd, has made four management appointments.

Managing director is Christopher Geer, an Oxford University graduate who spent the first ten years of his DP career with IBM. He also spent several years gaining sales management experience with Case, Eitel and Sperry Univac and most recently served as director of European operations at Microdata International.

David Warren joins the company as sales director. His recent experience in the industry has included a spell as sales manager with Data Recall,

national sales manager of what is now called CPT (UK), and a brief period working as sales director at the now defunct Supertyping Company.

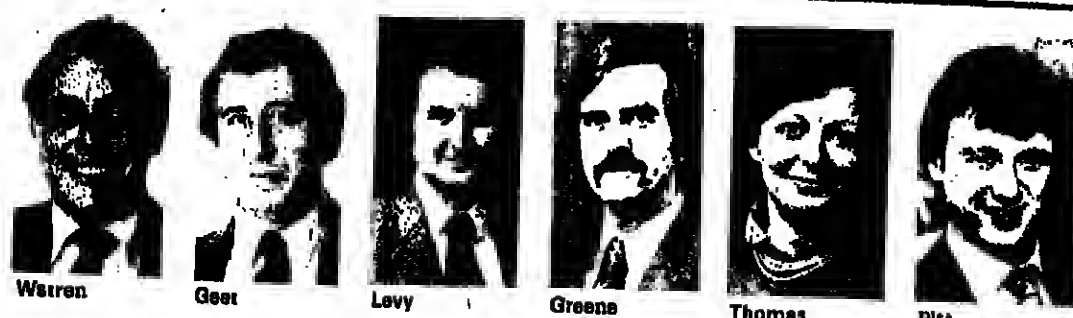
Technical manager Ronald Hale left the Royal Navy and joined ICL in 1960 as field engineer. After four years with Datacube, he joined Data 100 as senior engineer.

Roger Woollett has been named software manager. A graduate of London University, he worked at GEC Hirst Research Centre for seven years researching microwave tubes. He worked as head of the London University Computer Centre's advisory service and gained his commercial experience with Nixdorf and Data 100.

Robert Hunt has been appointed director of semiconductor memories at ITT Semiconductors. He will continue in his present role as plant manager at the company's Farns Cray division.

Nell Dempsey has been promoted from vice-president of sales to vice-president of marketing at Harris Corp's data communications division.

Richard Pitt has been appointed senior analyst at Zygol. He was formerly an analyst/programmer on Honeywell Level 6 machines.



Grand Met appointments

SEVERAL management and sales appointments have been made at systems and software house Grand Metropolitan Systems Ltd (GMSI).

Harold Gilmore has been appointed development director, responsible for systems development. Alan Glover, previously marketing and development director, has been appointed marketing director.

Jockie Shearer joins as sales support manager, and will be working with two newly appointed sales support consultants Gary Parsons and Peter Bentley.

Clive Taylor is project manager for the company, and controller of budgets and business planning is Adrian Pierce. He was previously senior project planner in the East Sussex County Engineer's Department of Grand Metropolitan.

Managing director at STL

A MANAGING director has been appointed at Standard Telecommunication Laboratories (STL), the British research centre of ITT. He is Dr John Shields, who has been with the company for ten years.

Dr Shields holds a PhD in nuclear physics from Glasgow University and is a member of the Institute of Electrical Engineers, and the Institute of Physics. Until his recent promotion, he was general technical director of ITT Europe based in Brussels. He has also been acting managing director of STL.

Richard Clark has joined Marcus Robn Associates as a senior consultant.

David Leagley has joined Harris Systems as marketing manager for the company's DDP display terminals and minis. He was formerly marketing support manager with Data 100.

South Bank Poly computing principal dies

PRINCIPAL lecturer in computing at South Bank Polytechnic, London, Gareth Pugh has died at the age of 41. After national service at the age of 18, he joined the staff of the Polytechnic in 1960. During his service there, his academic interests moved through computer science to computing, programming and principal lecturer in 1967, with a two-month spell as acting head of department.

He contributed to the development of courses in computing throughout his career, planning the BSC and BSC computer studies, the graduate diploma in computer science and the British Computer Society course.

Pugh served as an elected member of the Academic Board for several years. He also chaired several ILA (London Education Authority) computer management committees.

Guy Phillips has joined the Telecommunications Computer Centre as executive. He gained experience in the microcomputer and bureau services at Burroughs and GSI.

Frank Chambers has been appointed managing director of Spel Translators. He was formerly with the tech and has spent ten years in the industry.

THE independent UK mini-computer manufacturers, ABS Computers, Computer Technology and Digico, progressed at snail's pace through the Seventies. But new blood at the

top of each company has brought great hopes for the future. Computer Weekly talks to the new men and finds out why the companies could be ready to make an impact.

New blood gives triple boost to UK minimakers

by John Kavanagh

AT the start of the Seventies three small UK mini-computer manufacturers - Computer Technology, Digico and Allied Business Systems - were just getting off the ground.

By the end of the Seventies the three were still small - and still just getting off the ground. Their combined turnover was barely over £10 million.

But the companies have suddenly not only taken off, but are heading, if not for the stars, then at least beyond the clouds.

The three are different in their markets and levels of financial backing. What they have in common is that new blood has come in at the top, bringing entrepreneurial spirit and a vision of the future to CTL, a new structure to Digico and a clean sweep to Allied Business Systems, now ABS Computers.

Tony Davies is the new man at CTL. He has an extensive background but enjoys the marketing and financial aspects of running a company. Experience in these matters was gained at Membrain, the automatic test equipment manufacturer he formed to make his own system. He sold the company to Schlumberger in the late Seventies.

Davies is now head of Information Technology, formed as a

holding group for CTL and for planned new ventures. The first is Office Technology, which is developing products for the automated office market.

A holding group has also been formed at Digico. It is headed by Ken Atkinson, who arrived as marketing director in 1976 from Wang. He is now managing director of Spanverne Investments, the holding company for Digico and its new associate companies in maintenance, rentals, supplies and

On paper, the three seem the right sort of people coming in at the right time. CTL and Digico have been archetypal UK companies. They were formed by technical people with minicomputers of their own design, which have since become pretty well respected.

At CTL the designer was Iann Barron, now heading the National Enterprise Board's micro-electronics venture, Immos. He was backed by merchant banks and investment companies. But he was a technology man, so during the early Seventies a commercial managing director was brought in. CTL could not take the costs of an expanding sales operation and another managing director arrived to cut costs. He turned the company round for Bob Finch, the present managing director, a long-serving CTL man.

Finch continued to put emphasis on commercial systems, as opposed to CTL's traditional scientific markets, and brought in David Fear, formerly managing director of Prime Computer in the UK, as marketing manager. Davies got involved at the same time, widening CTL's scope with plans for new companies.

Digico's early successes were also in the scientific and process control fields. But by the mid-Seventies the minicomputer world was changing and a vast market for

small business systems was opening up. That was when Atkinson was brought in.

At ABS things happened in reverse order. The company was started by an entrepreneur who saw a future for minicomputers in the business market. He found a unique two-bus design, which ABS now builds in the UK. But the system was oversold, leading to cash flow problems.

ABS was taken over by the massive Trafalgar House group. Bladen was made managing director to put things right. "In the past the company had been run by entrepreneurs," he says. "I'm the first managing director who understands the products from the technical angle."

Bladen bought full manufacturing rights to the processor to give ABS 100% protection for its product and then set about the company with a broom.

"I've put to bed some of the things that kept us really things like overstocking and special deals," he says. "The applications programming team has been trimmed. Right years ago there were 250 programmers losing the company £70,000 a month. Now, there are six - and they're profitable."

When I took over we had seven salesmen, who reported directly to the managing director. I've



JOHN EL SOFM, ABS Computers: "I'm the first managing director who understands the products from the technical angle."



TONY DAVIES, Computer Technology: "What we've got to do now is get off our backsides and sell the products."



KEN ATKINSON, Digico: "A young OEM can come to us and get a sensible deal."

brought in an experienced sales director and we're working towards 32 sales people and extra sales offices."

Alcohol has been banned from the offices; even visitors are offered lemonade or orange juice: "We had a bit of a drink problem with some staff."

Some people have reacted by leaving, but Bladen believes the company is stronger for that: "People who are doing their fair share don't like to pass up a career. Besides, we can't afford them."

While ABS and CTL sell directly to users, Digico depends on systems houses. And Atkinson has taken Digico to extraordinary lengths to make it attractive to those companies.

Discounts are now based on projected turnover rather than on the number of systems ordered; if a systems house expects £100,000 of business in a year it gets a discount based on that figure. If it does £200,000 of business in the first quarter, the discount for the rest of the year is based on business worth £400,000.

Prices are structured even further to reduce the risk to systems houses. "We've looked at the risk areas and charge accordingly," says Atkinson. "For example, an OEM can get 32K of memory from us for just £1,000. So when he's sizing a system he

can be wrong by 32K and still not risk too much money."

Digico offers free use of its public relations services, including mail shots, advertising expertise, exhibition display equipment and brochure design and printing.

"Digico tries to meet its systems houses once a month to review their progress and give advice if needed. "We never try to run their companies for them or probe into their balance sheets," says Atkinson. "We help, but if they can't survive, that's their business."

There are sound business reasons for this apparent benevolence: "A young OEM can come to us and get a sensible deal. And we get sales without hassle. We're a hardware manufacturer, not a turnkey systems supplier."

Digico's expansion into other areas was financed by the sale of 15% of the company to four investment organisations. That deal raised £500,000 and was organised by the merchant bank, Robert Fleming, which is also sponsoring a planned share quotation on the Stock Exchange. Digico's new associate companies are independent of each other, reporting to the Spanverne Investments board.

The three UK minicomputer manufacturers are now all ready to go. Davies at CTL sums up the next step for all three: "What we've got to do now is get off our backsides and sell the products."

ComputerWeekly brings you COMPEC NORTH'81

Belle Vue, Manchester
June 23-25, 1981



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Liveware File

I LITTLE THOUGHT, THE DAY I PASSED... MY PROGRAMMER APTITUDE TEST.



...I'D JOIN THE MINERS IN THE FRONT LINE... OF THE INDUSTRIAL BATTLEFIELD!



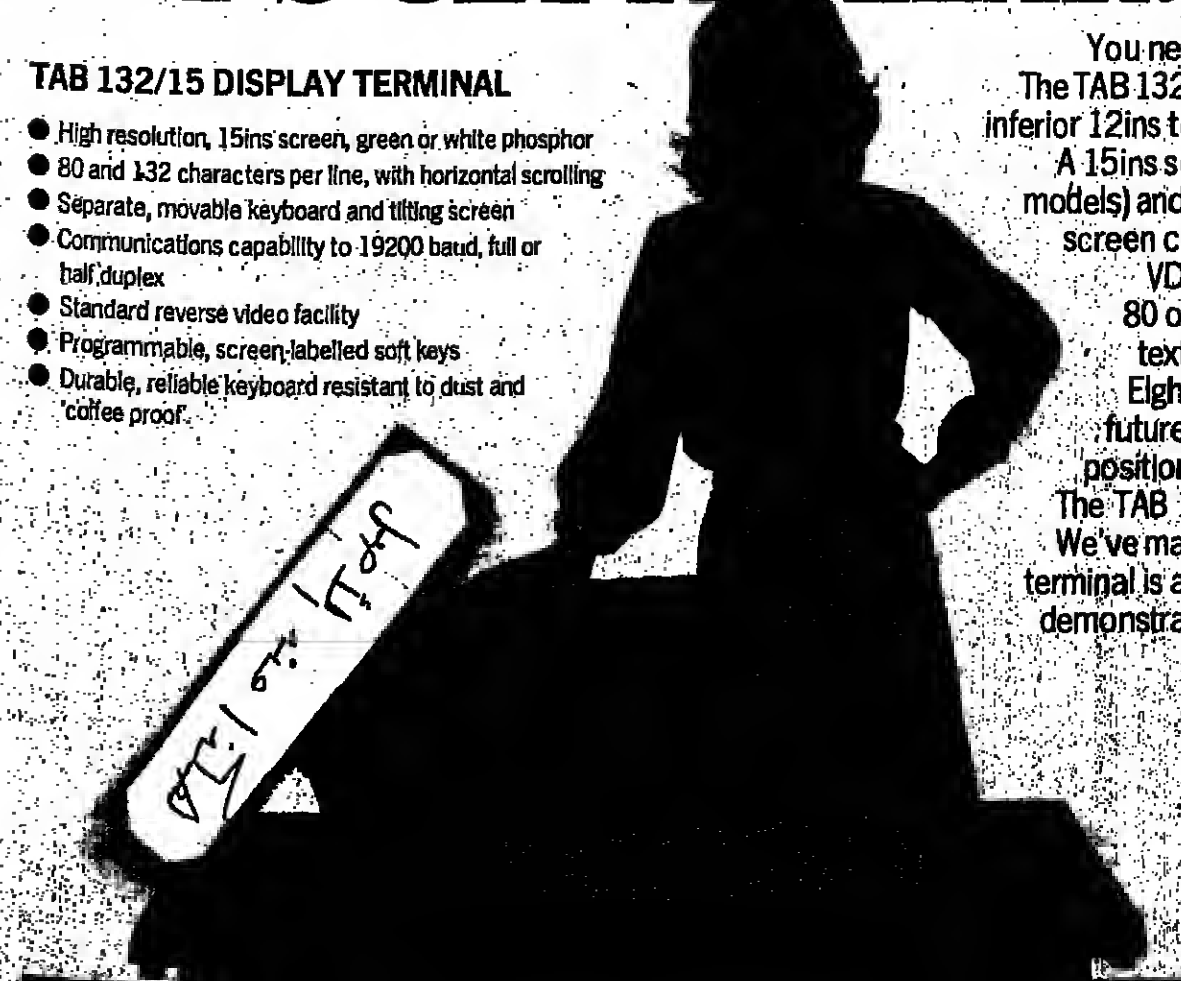
DIARY

- FEBRUARY 12
NOMAD, BCS Advanced Programming Group, Prudential Assurance Co. Holborn Bars, London. Details Peter Frowse, Birkbeck College, Tel: 01-580 6622.
- Half-day visit to Northwick Park, Harrow. BCS Medical groups.
- System X and its software. BCS Oxford sub-branch. Staff Coffee Lounge, Oxford Polytechnic. 7.45.
- FEBRUARY 13
Annual dinner dance. BCS Belfast branch. Culloden Hotel, Belfast. 8.00.
- FEBRUARY 16
Acquisition and retention of computer personnel. BCS Cheltenham and Glos branch. Queens Hotel, Cheltenham. 7.30.
- Microprocessors. BCS Glasgow branch. The Music Room, Staff Club, University of Strathclyde, John Street. 7.00.
- FEBRUARY 17
Social evening. BCS Chester and North Wales branch. Grosvenor Whiskey, Warrington. 7.30. Details A. Bewley, Holly Cottage, The Common, Buckley.
- FEBRUARY 18
Data communications in the Eighties. IDPM Central London branch. Paul and Dean Studio, 15 Brookwick Street, London W1. 8.00.
- Joint meeting of BCS Health branch and Ulster Society of Computers/Computers. Conway Hotel, Belfast. 7.30.
- Computer aided design. BCS Humberside branch. British Aerospace, 100 Victoria Road, Lincoln. 7.30.
- training. BCS Leeds branch. Puller Hotel, Leeds. 6.30.
- Computers in the energy industry. BCS Sussex branch. County Hall, Lewes, East Sussex. 7.30.
- FEBRUARY 19
Careers in computing. BCS Aberdeen branch. College of Commerce, Holburn Street, Aberdeen. 7.00.
- Joint meeting of BCS Central branch and BPCS BARBOS at IBM Midlands Marketing Support Centre, Warwick. 7.30. Number limited, so apply to Craig Gier at Coventry 72745.
- Stonehouse - megalithic mists of neolithic nonsense? BCS Gwent branch. Queens Hotel, Gwent. 7.30. Lyndford Road, Lyndford. 7.30.
- Meeting. BCS London Branch. Waldorf Hotel, Aldwych. 8.00.
- FEBRUARY 25
Microprocessors and applications. IDPM Norfolk branch. Cape Road, Norwich. 7.45.
- Word Processing. IDPM South branch. Sheffield. The Dell Computer Sales, Cemetery Road, Sheffield. 7.00.
- FEBRUARY 26
The Role of the User/Operator Relationship - Influence of the User on the Product. IDPM York branch. County Hotel, Kettlewell. 8.00.
- MARCH 3
The Role of the User/Operator Relationship - Influence of the User on the Product. IDPM York branch. County Hotel, Kettlewell. 8.00.
- Visit to Cheltenham. IDPM Cheltenham branch. Cheltenham. 7.30.
- Visit to Cheltenham. IDPM Cheltenham branch. Cheltenham. 7.30.

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Office of future designed with managers in mind

by Rory Johnston

THE paperless office of the future could become a practical reality if new ways for unskilled staff to interact with a computer, thought up at Imperial College, London, come to fruition.

Two researchers at the College have designed an electronic office which they call Panorama and for which they are now seeking development funds from industry, for the building of a prototype.

Bi-focal

Lecturers Robert Spence and Mark Apperley are concerned to overcome the reluctance of professionals and managers to use keyboards, and to make it easier to keep track of large numbers of documents held in an electronic store. To do this they envisage an office using a specially designed bi-focal screen, a simple voice recognition, and a wall acting as a visual index.

None of the Panorama ideas has yet been implemented, but they have been simulated in a videotape with which Spence and Apperley hope to convince a UK firm interested in office systems to fund a project, costing possibly £20,000, by which the ideas could be tested.

The purpose of the bi-focal display is to get around the "window" problem of how one sees a large number of pages on a normal-size screen, likened by Apperley to trying to read The Times through a keyhole. To solve this, a screen would be divided into a central, normal area, and two areas on either side in which documents

would appear squeezed to a small size, but in which their headings and colours would be visible. In this way, several documents in view could be identified but not read; for reading they would be scrolled into the central area where they would appear full size.

Implementing this would require only some special hardware in between the memory and the tube, said Apperley. The screen would be touch-sensitive to enable the user to select options, expand and shrink graphs, and so on.

To have a wide range of functions and files that can be called up with no need for a special command language, Spence and Apperley envisage the wall of the office being covered with labels or pictures, about 100 maximum, to which the user simply points for whatever he wants to do. The pointing would probably be sensed electronically, with the user holding a wand or having a small unit incorporated in, say a cuff-link. A spot of light would be projected on the wall to give him feedback to where he was pointing.

Pictures

The electromagnetic sensing would use coils in the same way as Ferranti's gun-aiming unit is built into a fighter pilot's helmet: the pilot simply turns his head to the target.

The pictures on the wall, called "icons", could be handwritten labels, covers of magazines and the like. Alternatively, they could be projected from a computer-

controlled slide carousel, giving an unlimited index in effect. Action commands would be given to the system via a limited-vocabulary voice recognition device, and any text, such as notes to be added to documents, would be fed in on a handprint tablet.

Audio dictation

Spence and Apperley assume most document creation will be by audio dictation; the secretary in the next room has a keyboard. Incoming paper would all be held as video images, necessarily taking up a lot of store. This, and the need for band-indexing such video documents are two of the main question marks over the practicality of the system, which needs to be tested on a prototype.

Panorama has the advantage that little change has to be made in the appearance of the office — something to which managers are sensitive. It is case of use and the lack of a command language that Spence and Apperley are concentrating on; they are not concerned at the moment with information retrieval strategies.

Their problem now is that the elaborate access devices are not necessary until a large database is there to be used, but until the system is working there is no incentive to construct the database.

There is little doubt that the hardware would work as the Imperial people envisage; it is systems problems that need to be tackled, to find out whether the new techniques are easy to use in practice.



Robert Spence demonstrates his mock-up of a touch-sensitive bi-focal screen for the paperless office of the future. Several documents could be shown on the screen at once by compressing them at the slides.

Computer-produced identity cards worry the French

by Jack Gee

FRANCE'S National Commission for Computer Technology and Liberty is awaiting the result of tests by experts to determine whether the government is telling the truth and nothing but the truth about its new computer-produced identity cards.

The Commission's specialists are examining the cards closely to see whether any secret machine-readable information is concealed to them.

The government claims that the only information on the card is visible in the letters which give the holder's identity and the card's number alongside his photograph and signature.

The Commission has sent a team of experts to Levallois on the outskirts of Paris to visit the first of six planned factories which will produce the new cards.

Commission director Louis Joliet told me, "I do not want to guess what their findings will be when they produce their report, but I have confidence in the specialists in the data processing industry who are working on our behalf."

The government claims that the identity cards and the residence permits issued to France's four million foreign residents are not ushering in George Orwell's 1984 era of "Big Brother" eavesdropping.

But director Joliet said: "Of course, it would be possible for the Commission's experts to give the new cards a clean bill of health and for the authorities to modify them later. After all, the pencil code forbids theft, but thieves are at work every day."

Almost simultaneously with the issue of the first new cards to residents in the southern Paris suburbs, the government has published decrees which bring into force a new Bill which will increase the powers of the police to require the presentation of identity cards on demand.

Denial

The government admits that it has a central file of information about foreigners which is being fed into a databank. But it denies it is setting up a centrally computerised record of French citizens.

The new plastic yellow-orange card measures 8.9 centimetres by 12.5cm. It incorporates a five-pattern engraved pattern by a computer which makes it impossible to reproduce without complex equipment. The signature and photo are reproduced by laser digitally.

Introduction of the new card has not been the subject of a formal Parliamentary debate. But the government claims that it has taken heed of the recommendations of the Commission.

Suspicion about Interior Minister Christian Bonnet's ultimate motive is heightened by the presence on some specimen cards of the codes "ID" (for identity) or "IF" for French nationality.

The Interior Ministry says that the innovations will prove to be a valuable instrument in the fight against criminals using forged documents.

The argument that the new card is a threat to democracy upheld by organisations like former World War II resisters and Jews who survived Nazi occupation thanks to forged identity papers.

Stressing the need to give criminals using aliases a taste of justice, the police insist that when France's Public Law No 1, Jacques Madaire, was introduced in 1979, he found 37 identity cards — all but him — on his table.

Lionel Stoleru, France's Minister for Immigrant Workers, says: "The new optically readable identity card is absolutely indispensable to enable us to manage our huge foreign labour force."

Introduction of the card will enable the government to implement a plan which it has long been nursing. To reduce unemployment, which now exceeds 1.6 million, it intends to get rid of 400,000 foreign workers.

Infotech goes into liquidation

● From front page

equally between them. Goodman was manoeuvred off the board. Infotech was hit again at the beginning of this year by what Williams describes as "disagreements among shareholders."

On January 8 John Blake, former sales director, was handed a writ and shown out of the building. When contacted Blake refused to make any comment.

Since Infotech Ltd issued the writ a dual power base developed with Goodman sending round a letter in support of Blake and try-

ing at one stage to pass his voting rights to Blake. Linked up against Blake and Goodman were Wilkins, plus managing director Chris Boon and product director Keith Robinson.

Blake has remained near to Infotech since his dismissal because Goodman's new company, Know Now, also had its offices in the same building as Infotech.

Know Now leased its first floor offices of Nicholson House, Maidenhead, on February 6 to move to new premises in Cookham.

On February 5 Blake held a meeting with about a dozen Info-

tech employees to discuss, he says, "the possibility for continued parts of Infotech."

Goodman, who was informed of the collapse on the evening of February 5, when director Chris Spenser phoned him, says: "The board were bent on liquidating the company and I talked with John Blake in an attempt to resist a controlling interest."

He continued: "It's a tragedy, but the next two weeks will be a serious attempt to resist parts of the company. I will not let the liquidation follow its course."

Call for UK systems university

A NEW university devoted solely to teaching computing and systems communication skills is urgently needed in the UK to prevent the country out of its economic development, according to David Butler, Secretary of the British Computer Society.

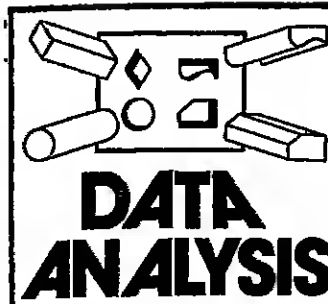
During this year's British Computer Society lecture entitled Britain and the Information Society, Butler asserted that his Society's university would attract students from all over the world, but

would attract investment from foreign companies, as well as plenty of foreign students.

The Systems University would teach undergraduates in the fields of both practical and theoretical systems and office automation, and would also have a one-year postgraduate course for people from other universities. The university would have an influence of

members of foreign students. To capitalise on British National's Virentia Corporation should be established jointly by British Telecom, the Information Society, and the new university.

Butler said: "The university would be able to train people in the City and get government research contracts. I would concentrate on the practical aspects of systems, rather than the theoretical aspects."



Documenting the entity life cycle

Section I — Part 17

of our series describing a system design methodology

by Rosemary Rock-Evans

IN Part 16, the concept of entity life cycles was introduced as a method of documenting the "life" of an entity as seen by the business, by examining all the events which affected the entity.

The first two steps in drawing entity life cycles were described — summarising the elementary functions' use of entity types, and deciding which entity types merited further study.

This week, the next two steps in drawing entity life cycles are described: determining the valid states of an entity, and drawing the entity life cycle diagram.

In earlier articles the concept of entity sub-types was described. Entity sub-types are mutually exclusive groups of entities within the same entity type, eg. "Male" or "Female"; "Married" or "Not Married".

The "state" of an entity type is simply a combination of event-driven entity sub-types, eg. "Married Parent". Only events which meet the following two criteria are used to determine states:

a) The event must alter the value or values of an attribute or attributes of an entity, or the relationship(s) with other entities.

b) Subsequent events must in some way be dependent for their occurrence on the event being studied. In other words, if absolutely anything can happen after an event, it is not useful to consider it when determining states.

Thus, for example, an inquiry into the health of a patient would not cause a change of state.

In most cases the valid states of an entity type can be seen fairly easily without the entity type being studied in too much depth.

For example, the valid states of

an appointment might be "booked", "kept", "broken", "cancelled", or "archived".

In the example shown in Figure 1, each state is a direct result of one event.

In drawing entity life cycles, the grid produced in the first stages of entity life cycle analysis is used to identify the events which affect the entity type.

In Figure 2, the conventions for drawing entity life cycles are shown. The initiating event is shown by a large arrow, and thereafter a single-line arrow is used to show the function which has altered the entity's state.

There should only be one start point on the diagram. Where the state of an entity has not changed despite a function acting upon it, eg. "Doctor's Inquiry", an involved arrow is used.

The final state is represented by a double circle. This state is often "Archived".

In Figure 3, the entity life cycle diagram for an appointment is shown.

The event "Booking" initiates the entity's life, ie creates the entity. Thereafter, the appointment is either kept, broken or cancelled and then archived.

The advantage of entity life cycle diagrams is that they can repre-

sent pictorially all the important elementary functions in which an entity is involved — something which is not possible, for instance, with structure diagrams (the diagrams used in structured programming).

Even so, in some cases the diagram becomes so complex that it is not worth drawing. In this event only the entity life cycle matrix (described in the following article) in worth completing. (The entity life cycle matrix contains all the events and functions which affect an entity.)

It is usually best to include only the functions which cause a change of state in the entity life cycle diagrams.

3. Combinations of Events. Drawing an entity life cycle where the events produce mutually exclusive states is fairly straightforward. Complications arise, however, if the states produced by events occur at the same time, for example, a person can be both married and a parent at the same time.

In our previous example, we chose states which could not exist simultaneously: an Appointment cannot be "Booked" and "Broken" at the same time, or "Kept" and "Cancelled", one of these states cancels out the other.

Where combinations of events

are possible we must identify every set of mutually exclusive groups.

For example: If we consider the Patient, this groups of states may be:

1. Referred
2. Discharged
3. Admitted
4. Archived
5. Single
6. Divorced
7. Widowed
8. Married
9. Under 16
10. 16 and over

None of the states can exist simultaneously in a set.

It is not always obvious, however, whether the correct grouping has been chosen to get exclusivity. For example, the states "Under 16" and "Married" are invalid if found together, hence there is dependence between Group 2 and Group 3.

To ensure that the correct mutually exclusive groups of states have been chosen, a device called the valid state diagram is used.

The Patient entity type will be used to illustrate the use of valid state diagrams.

3.1. Steps in determining the valid states of an entity type. i. From the grid produced in the first stages of entity life cycle analysis, identify the events which affect the entity, removing those which do not change attributes or relationships, or affect subsequent events.

ii. Group the events together where it is immediately obvious that they cannot happen in parallel (in other words, they cannot produce states that occur concurrently).

iii. Draw a table with these groups listed in columns. An example is shown in Figure 1. Do not include groups of states which

COMMON STATE NAME	Entity sub-type Valid or invalid?	Under 16 16 and over	Married Single Divorced Widowed
Single child	invalid	under 16	married
Married, single, Divorced, widowed	valid	under 16 under 16 under 16 over 16	single divorced widowed M,S,D,W

Figure 1. Valid state diagram.

are valid in combination with all other groups. The number of combinations to check is calculated by multiplying the number of sub-types in each column heading — e.g. in our example there are $2 \times 4 = 8$ combinations to check. iv. Identify the valid and invalid combinations. v. Allocate a "common state name" to the valid combinations. vi. Use the common state names to draw the entity life cycle.

Where groups of states are in no way dependent, an entity life cycle is then drawn for each group. In our example the patient entity type would have had two entity life cycle diagrams, one for the referred, discharged, admitted, archived cycle and the other for the valid states shown in Figure 1.

Further points

1. In the article on entity sub-types it was stated that these are usually distinguished by the value of attributes. In the Patient example, the following sub-types might have been represented by the attribute values shown in Figure 4.

It is not uncommon, however, for a computer system to force the user into providing only valid states for entity types. This occurs when the systems analyst allocates

code values to the valid combinations of states. For example:

Code	State
01	Single Under 16
02	Married (Over 16)
03	Divorced and Over 16

This, of course, simplifies validation considerably and is in some cases the only solution, where a system has to be developed in a short space of time and elaborate validation routines cannot be designed in the time available.

It can, however, make processing much more complex, since if processing is dependent on the single event entity sub-types which have made up the state, the combination has to be unravelled into its constituent parts every time processing is required on them.

In the long run, it is usually better, where the time is available, to design exhaustive validation routines rather than design combination "state" codes.

Entity life cycle diagrams describe concisely the precedence of events and functions in which the entity is involved, and the state in which the entity must be before that event/function can occur.

The Data Analysis methodology was developed at GACI by Ian Palmer.

ENTITY SUB-TYPES	ATTRIBUTE VALUE	ATTRIBUTE TYPE
Dead	A valid date	Date of death
Alive	Null	
Born	A valid date	Date of birth
Not Born	Null	

Figure 4.

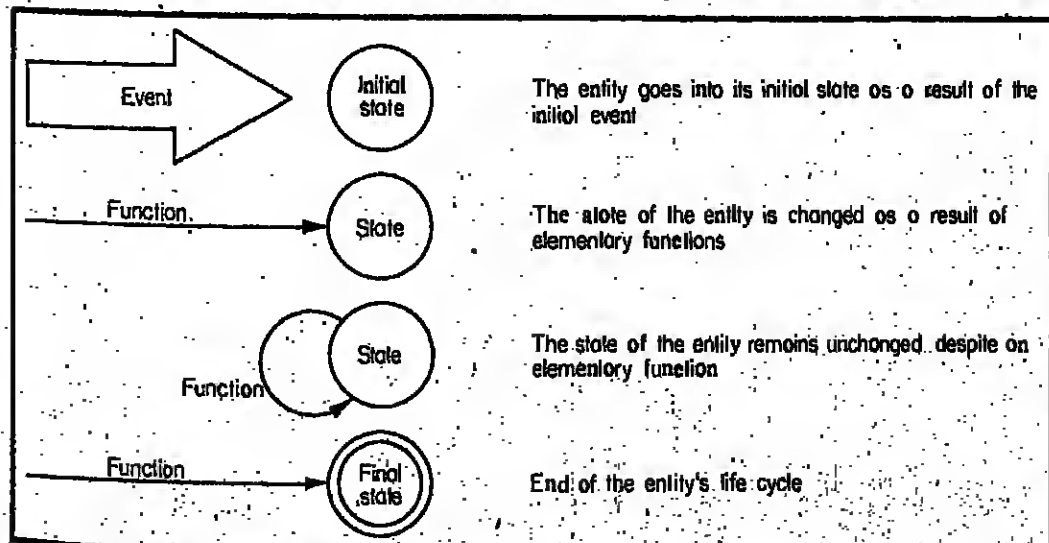


Figure 2. Conventions for entity life cycles.

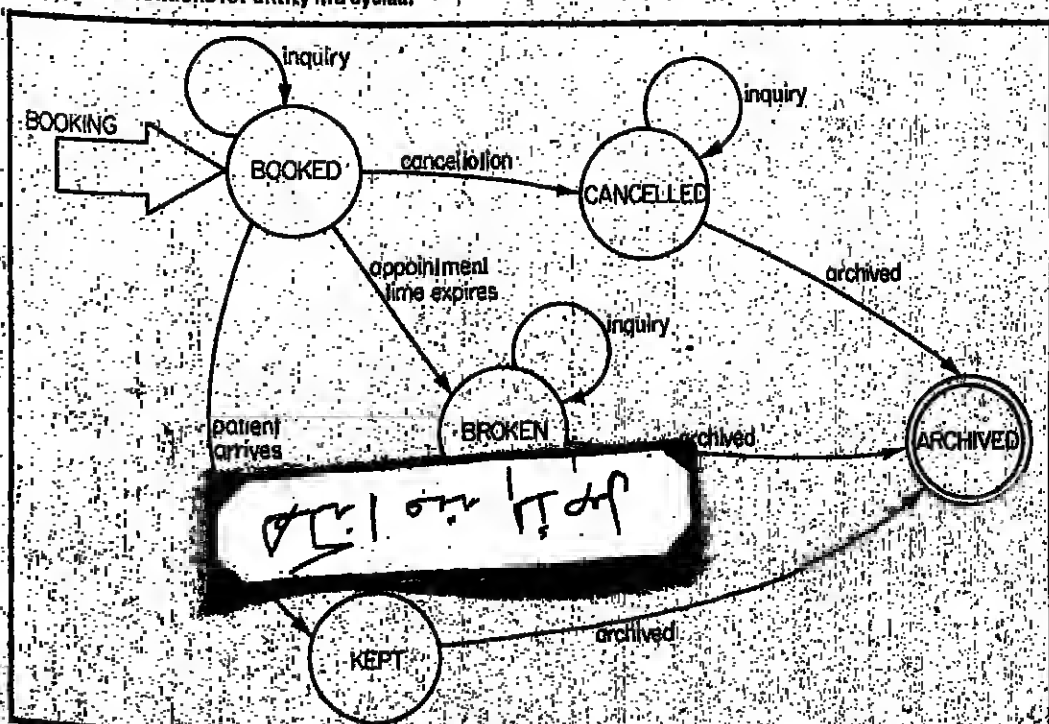


Figure 3. Appointment entity life cycle diagram.

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Public procurement policies may hamstring the UK industry

by Nicholas Enticknap

THE UK computer industry has always been hampered by the lack of an appropriate government policy. The new Ministry of Information Technology was to be set up with a particular view to the future of the UK computer industry. But the preferential procurement policy which the EDC may operate could prove a hindrance to development. This article looks at why the industry has suffered in the past and examines the problems presented by a policy which is now illegal under EEC law.

The setting up of the Ministry of Information Technology, and the first meeting of the new-looking Electronics Economic Development Committee, brought fresh hope for the future of the UK computer industry. But the preferential procurement policy which the EDC may operate could prove a hindrance to development. This article looks at why the industry has suffered in the past and examines the problems presented by a policy which is now illegal under EEC law.



Kenneth Baker



Sir William Barlow

Firstly, the new Minister, Kenneth Baker, has had a long association with the industry and is familiar with its problems. Secondly, portfolios were reorganised, so that for the first time one man had responsibility for the distinct but even more closely related areas of telecommunications, microelectronics, robotics and public procurement. In the same month, the reconstituted Electronics Economic Development Committee (EDC) held its first meeting. The chairman, Sir Henry Chilver, has made it clear that the existence of this committee symbolises a change of emphasis from the detailed investigations of the sector working parties, to a more fundamental search for an effective strategy for the industry.

The influence that the committee will have can be gauged from the list of members, which includes Chris Wilson (ICL), Sir William Barlow (Thorn-EMI), Sir Kenneth Corfield (STC), James Merriman (NCC) and Des Plessey (Plessey).

These developments must have implanted fresh hope in the breasts of all those who believe that a strong UK computer industry is

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demand of the market and then the degree to which our indigenous industry is capable of meeting it, before the nature of the remedies can be specified.

Secondly, the statement quoted is a fairly accurate summary of the solution adopted over the past 10 years. And if there is one thing that everybody is agreed upon, it is that government action over that period has been totally inadequate.

Single tender

Let's forget the question of handouts for the moment. Quite why an industry with so much potential should be denied handouts, when a lame duck like British Leyland was given £990 million, and, earlier, a technological white elephant like Concorde consumed public money to the tune of 10 digits of pounds sterling, is difficult to understand. But the main question I wish to raise is about the desirability of a preferential procurement policy.

We had one of those right up to December 31 last year. It was known as the single tender policy, and it provided that for computer systems over a certain size, government bodies had to purchase from a British supplier. In practice, that meant purchasing from ICL.

This policy was unsatisfactory for a number of reasons. In the first place, it gave ICL very little help, and the rest of the industry none at all. For the past three years or so it accounted for about five per cent of ICL's turnover. In the last year, that meant about £33 million. A sizeable amount of that business would have gone to ICL anyway; much of it was repeat business, and the industry standard for retaining existing customers is 80 per cent and in any case, ICL usually gets about a third of all UK mainframe sales.

So, being generous to the government, it can be said that single tender accounted for £20 million of ICL's business last year. That's not £20 million profit; to get that money ICL had to supply and deliver goods. The real value to ICL is therefore minimal.

On the cheap

The policy had several unpleasant side effects. It encouraged complacency within ICL, with the best will in the world, you are not going to put so much effort into a contract you know is secure, as you would put into one you are competing for. It also aroused resentment among users; nobody likes being told what to do.

Added to this it gave a hammer to ICL's competitors; they get as much mileage out of attacking single tender as they would had the company been heavily subsidised. (I'm amazed at how many computer professionals I meet who think that ICL is subsidised).

Finally, it encouraged government to think it was doing something when in fact it was doing nothing; it's a policy on the cheap.



ICL chairman Choppell... "We regret the lack of progress made during the past year towards adopting a European public sector procurement and support strategy."

ing experience. The turgidity of the prose makes an ordinary legal document look like a masterpiece of lucidity. The whole of the first page and some of the second of the three-page document is taken up with clauses beginning "whereas". Every other sentence refers you to some other document; indeed, the Directive itself is an amendment to a previous Directive.

After some time spent in hard study, I found that the purpose of the Directive "is to establish an international framework of balanced rights and obligations with respect to government procurement, with a view to achieving liberalisation and expansion of world trade." One could be forgiven for thinking that this runs totally contrary to the objective of the EEC as a whole, which is to further the interests of the Community members (isn't it?).



James Merriman

The explanation for this apparent anomaly can be found in one of the documents to which the Directive refers, which states that "the aim of the Commission's proposal is to avoid inconsistencies between the Community and GATT". The objective cited in the previous paragraph is thus revealed as a GATT objective, which raises the obvious question: What is GATT?

GATT is a group of 80 or so trading nations which have agreed to follow certain trading practices with a view to meeting the objective described. The EEC is a party to this agreement and therefore GATT policies should be incorporated in its own legislation.

The consequences are not so logical. Take the US, for instance: the US is a signatory to GATT, and is therefore bound to follow the same open public contract tendering procedures as the EEC countries.

new legislation, therefore, merely put our EEC countries in a position of equality with public tenders are concerned, it is a pity that the answers are available only in the separate instructor's manual.

The index, appendices and margin notes make finding information easy. The book is thus a sound introduction for the beginner and a useful reference manual for the experienced programmer.

The author's approach to Cobol is to start with the Procedure Division, thus enabling the student to write simple programs from an early stage. Inevitably, many rules have to be mastered in close succession but these are clarified by appropriate diagrams or examples.

Chapters 3 to 5 cover sorting, arithmetic and conditions. Lyons tackles the SORT statement earlier than many manual-writers because of its essential part in so many systems and leaves the discussion of number systems - sometimes a very early topic - until chapter 6.

Chapters 7 and 8 introduce the student to the Identification, Environment and Data Divisions, thus allowing him to write complete programs rather than relying on the standard divisions supplied hitherto.

Chapters 9 and 10 examine the OPEN and CLOSE statements, input and output, file organisation and the PERFORM statement.

The last part of the book is devoted to some of the more advanced features of Cobol, some of which are not always covered in beginners' manuals.

BOOK REVIEWS

Charting the route for software use

Software Configuration Management by Edward H. Baroff, Vila D. Henderson and Stanley G. Siegel. 385pp. Prentice-Hall International, London.

ANY book which addresses interests ranging from pocket calculators like the TI-59 or HP-41C, minicomputers such as the PDP-11 and large-scale systems like IBM 370 and Cray 1 array processors, deserves more than casual interest within the industry.

The work under review suffers several disadvantages from a European reader's standpoint as it was obviously directed to-

wards the American market in the first instance.

There are some dated references to the late 1960s and it is the combined work of three authors. The book also requires knowledge of basic algebraic concepts and carries the by-now obligatory quota of exercises.

It is a credit to all concerned - not least the subject matter - that the book survives as an impressive piece of work despite these preliminary reservations.

The theme the authors emphasise is discipline as it is applied to the development of

software products, and the methodology known as Software Configuration Management is developed fully.

Anyone wishing to develop his or her knowledge about software and the art of development management would bear at home with this volume. For those who are uncertain about the concept of SCM, the authors suggest an apt analogy between the methodology and using maps.

One may arrive at the chosen destination without the benefit of a map, given time, luck and "gas". But armed with a map, the

journey is accomplished on time and minus wear and tear.

The key to SCM appears to be identification, and getting the basic labelling correct eliminates many subsequent problems.

At the same time, rival publishers should take note of the general presentation. The book is well and interestingly written, clearly illustrated and exceedingly well indexed.

Perhaps this is only what is to be expected in a book subtitled An Investment in Product Integrity.

ALAN SIMPSON

Two approaches to Cobol work

Structured Cobol for Data Processing by Norman Lyons. 326pp. £6.50. Glencoe Publishing Co Inc, 17337 Ventura Boulevard, Encino, California. British publisher: Collier Macmillan, Stockley Close, Stockley Road, W. Drayton UB7 9BE. Tel. No. 08954 40651.

STRUCTURED Cobol for Data Processing is obviously a book written with beginners in mind and Norman Lyons opens with brief notes on the growing importance of computers. He follows with basic information on programming languages, data processing vocabulary and symbols in a well-illustrated chapter.

The author's approach to Cobol is to start with the Procedure Division, thus enabling the student to write simple programs from an early stage. Inevitably, many rules have to be mastered in close succession but these are clarified by appropriate diagrams or examples.

Chapters 3 to 5 cover sorting, arithmetic and conditions. Lyons tackles the SORT statement earlier than many manual-writers because of its essential part in so many systems and leaves the discussion of number systems - sometimes a very early topic - until chapter 6.

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The last part of the book is devoted to some of the more advanced features of Cobol, some of which are not always covered in beginners' manuals.

New points are illustrated using a file of information on university

students, thus creating both realism and continuity.

Exercises following each chapter test the student's understanding but it is a pity that the answers are available only in the separate instructor's manual.

The index, appendices and margin notes make finding information easy. The book is thus a sound introduction for the beginner and a useful reference manual for the experienced programmer.

A Programmer's Guide to Cobol, by William J. Harrison. 232pp. £14.20. Van Nostrand Reinhold, 135 West 50th Street, New York, NY 10020. British publisher: Van Nostrand Reinhold Co Ltd, Molly Millars Lane, Wokingham, Berkshire.

A PROGRAMMER'S Guide to Cobol is not a book for beginners. Harrison makes it quite clear that the reader will need to have a fairly extensive knowledge of Cobol if he is to benefit.

Furthermore, he is not attempting to teach the syntax of Cobol but rather to show how it can be used to the best advantage in producing programs written in good style.

The author takes the precaution of including an appendix giving an outline of the basic rules of Cobol for those who need to revise them.

His first two chapters also include some basic material on data processing and language structure.

The remaining 13 chapters take one topic at a time, and begin with a review of fundamental procedures, and study the features of Cobol that are not always used to maximum advantage.

Each topic is treated independently. Harrison attempts to keep his comments machine independent but where necessary refers to an IBM system. He refers the reader

Future of the printed word

The Future of the Printed Word. The Impact and the Implications of the New Communications Technology. Edited by Philip Hills, £10. Frances Pinter, London.

IN one sense, the accumulated message of this collection of papers is an anti-climax, but it does provide a healthy corrective to the wider and headier excesses of our electronic enthusiasms.

The apparent anti-climax is a simple point, made in the opening articles: "no matter what kinds of exotic technology we employ, people will still be reading."

It is clear that the Director of the New Communications Technology, which the Member States of this Directive and the EEC Agreement.

However you interpret it, it is clear that the Director of the New Communications Technology, which the Member States of this Directive and the EEC Agreement.

But can be, or even be, a professional publisher. The world of scientific and technical publishing in the late 1970s will not

differs much from today, though it will be more disorderly.

It is as though a published record were being kept of a conference that never was and the editor asks readers to participate in the conference discussions.

Should there be enough makers and he thinks the response justifies it - he promises to publish them as a second volume.

The views expressed in the book differ in detail and presentation but demonstrate a good deal of consistency.

The papers are certainly well worth reading as they provide a sensible perspective.

ISRAEL BERKOVITCH



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Database design

Database - Structured Techniques for Design, Performance and Management by S. Atre. 442 pp. John Wiley and Sons.

COVERING topics like data, database administration, database design, database implementation and performance problems, this book provides a useful and well presented theoretical review of the whole topic.

It includes and exemplifies the hierarchical, network and inverted

file database management systems, providing a helpful comparison.

The basic approach to database management systems is based on IBM-compatible systems, due to the author's personal experience. Nevertheless, the book is suitable for anyone studying databases and their design.

Database administration is explained fully, and the author envisages a comprehensive and very senior position for this function.

A. J. THOMAS

Making ZX80 clear

The ZX80 Pocket Book, by Trevor Toms. 128pp. £4.95 inc. p&p. Phipps Associates, 3 Downs Avenue, Epsom, Surrey.

IN a relatively short time, the ZX80 personal microcomputer has become well known to the public. Trevor Toms attempts to expand the knowledge of its present users and the potential market.

Although not intended for the absolute beginner, the book reviews the ZX80 Basic, giving hints and examples for its efficient use, and highlights some of the inconsistencies of Basic which in themselves are not confined to the ZX80.

On the basic 1K RAM system, program size is obviously critical. Useful hints and examples are provided to minimise size by, for example, efficient use of GOSUB and minimal use of REM statements. The command set is also clearly described in alphabetical sequence.

BARRY FISHER

In this review of the application of viewdata/videtex technology in business, by MIKE ALDRICH, current and potential uses are discussed, cost effective applications are highlighted and future development is predicted.

How viewdata is being used in business

VIEWDATA is a word that means many things to different people. The word itself is rapidly becoming obsolete. A new word, "videtex", is increasingly being used as a substitute.

In order to avoid confusion, some definitions might be useful.

Firstly, what is viewdata/videtex? It is a new communications medium.

What is its purpose? The purpose of viewdata/videtex is to improve communication between people through the use of a computer-assisted message system for sending and receiving messages of varying degrees of complexity (the physical part of viewdata). It has an ability to apply computer processing to the messages themselves, enabling a chain of events to be set in motion automatically by the computer through understanding the meaning of a message (the logical part of viewdata).

Viewdata/videtex is interesting because it is of universal significance - anyone can use it. It can be installed in the home and in business, and it is relatively inexpensive - most organisations can afford it.

Viewdata/videtex technology consists of the ability to display textual and graphical information on a modified domestic television, in a multi-colour, stylised format, where the television is connected to a telephone line and from there to a computer.

The television user communicates with the television either by voice command or keyboard command. Thus, a television can be switched from News at Ten to viewdata terminal at the press of a button. It can automatically dial into any suitably equipped computer in the world and the user can access and retrieve information, set in train complex transactions or merely leave a message for a friend.

The television can be equipped with certain additional features to ease communication - a printer to avoid jotting down information from the screen; a memory on the television to store and recall useful information without recourse to the computer; and a directory of telephone numbers of most frequently used services. In due course the television will also be equipped for local computer processing in much the same way as personal computers. The potential use of the technology is wide ranging. At the simple level, it is the first new participatory communications medium since the invention of the telephone.

The implementation of this technology is in its infancy. The lead role has been taken by British Telecom in its development of a public viewdata service called Prestel. Many other postal and telecommunications authorities around the world are pursuing similar programmes.

However, Prestel is but one possible use for viewdata technology. The great advantage of Prestel is that by its very existence it has created a wealth of knowledge and expertise in a new communications technology that is now ready for commercial exploitation by UK companies on a grand scale.

A viewdata industry exists in the UK, and covers the technology of viewdata - design and implementation of hardware/software

systems - as well as its media, i.e. editorial layout and control, presentation, even colour usage, graphic arts and human interaction. Through Prestel, an embryonic information breaking business has been created exploring new frontiers in values of information and service in a new Information Society.

Prestel began as a mass market viewdata information dissemination system aimed at the domestic residential market. It is apparent that the domestic residential market is not ready for profitable penetration yet, and Prestel is

The great advantage of Prestel is that by its very existence it has created a wealth of knowledge and expertise in a new communications technology that is now ready for commercial exploitation by British companies on a grand scale.

therefore seeking to address the business market for information dissemination systems.

However, the business market is also being addressed by high technology, cost-effective private viewdata systems that Prestel cannot be expected to compete with. The market is fortunately big enough for everyone.

The magic word in private viewdata systems is integration. The integration of viewdata technology with processing, networking, data management, and other computer-assisted human interface devices provides a multi-media communication system of unparalleled power and flexibility. Command an action from the viewdata television, print the result from a terminal printer; send a message from a hand-print terminal and display it on a viewdata television 10,000 miles away; type and edit a letter on a word processing system and send it to a viewdata television to the home. This integration is already available.

The uses of viewdata in business are in three main areas of interest: information dissemination; action or transaction systems and education or computer assisted learning systems. Dwarling all of these usage areas is the issue of integration both at a systems level and at a business level.

Prestel is an information dissemination system that is a stand alone system. Integration with other types of information dissemination systems is not yet feasible. However, there already exists a private viewdata system, the Rediffon R1800 Series, which can be integrated with existing information dissemination systems, enabling a company with a computerised database to speak a viewdata-style message. The structure of the database on the existing computer would remain unchanged.

Because it is possible to integrate viewdata technology into existing computerised systems, the possibilities with action or transaction-oriented systems are many. Viewdata windows can be bolted on to existing real time systems enabling the use of the real time system by inexperienced users.

To the education or computer-assisted learning application where the viewdata terminal is used for instruction, it is possible to integrate instruction, pacing, scoring, remedial instruction, revision and query response in one instruction system, at a cost per terminal hour that is trivial compared to previous CAL systems.

For all these uses, the colour television terminal is significantly less expensive than a conventional computer terminal and because of its television attributes, it is considered to be less threatening in the behavioural sense. With computer devices, reductions in cost and lowering the knowledge threshold of the user result in the multiplication of market potential.

In any enterprise there are two arenas for viewdata usage - internally and externally. The internal usage can be triggered by a number of considerations: Viewdata can be used to provide wide-ranging computer assistance to non-expert computer users (most of the people in the enterprise); it can be used as a replacement for older technologies (e.g. classroom teaching) and it can create new levels of shared understanding within an enterprise through its capability to communicate effectively, quickly and cheaply.

The filtering prize to improved internal communications is the potential increase in managerial span of control. Reporting structures and ratios can be changed and managerial productivity can be radically improved. At the same time, the application of viewdata and other integrated communication and recording technologies in the office will improve white collar productivity.

Viewdata is considered ideal for managerial workstations, because of simplicity of use and its communication potential both for the individual and for groups of people. A television screen can be viewed by a number of people from four to eight feet from the screen.

The following is an example of integrated communication and recording systems: Meetings are held and minutes are taken. Invariably, there are action items in the minutes. A manager needs to be assured that action items are undertaken by himself and his subordinates are completed on time as agreed. Management's span of control is often restricted.

A simple application for new technology might be to type the minutes of a meeting on a word processor, automatically generate the action points by person by determinant, distribute the minutes to the appropriate in-tray of all recipients (a logical part of the computer package), allow each recipient to access the minutes of the meeting and generate the recipient and the action points by date, subject and worked generated.

Input of services material would be by word processor. Retrieval, manipulation and update of information are by viewdata terminal.



The author, Michael J. Aldrich (left), is managing director and chief executive officer of Rediffon Computers Ltd., the second largest British-owned computer manufacturer. Aldrich graduated from university in 1962 with an honours degree in history and spent his entire career in the computer industry. He is the author of over 40 published articles on business computing. He has lectured widely in the UK, Western and Eastern Europe, the Middle and Far East. Aldrich is a professional member of the British Computer Society and a member of the British Institute of Management.

in business in the UK is clouded by mystery of confidentiality agreements. Much is going on behind closed doors. There are reasons for the confidentiality agreements. Firstly, customer integration plans have competitive trading impact. Secondly, some systems are at the formative stage with impact on staffing and procedures still to be resolved.

The scope of activity is formidable. Customer integration through viewdata by-passes existing business communication interfaces with customers - the branches, mail, telephone. Integration can take place either via domestic or business line. Viewdata shopping will impact on mail outlets during the 1980s. Viewdata supermarket marketing a wide range of goods is a liveable in a collection centre. The home is already a computer proposition.

The Information Service business, also identified recently by the US as Viewdata Value Added Networks, has already seen. Brokers are selling information and services. There is a tremendous potential for neighbouring computer centres providing a service business and offering a service. The use of a disc for data storage will open doors to the high street where the ultimate home viewdata television for home and reference from home.

The attachment of video recorders to viewdata terminals with integrated electronic provides a unique mixture of text, audio and video communication. Missed media communication will appear during 1981. In the video disc will offer even more remarkable opportunities.

For the next few years, the thrust of business viewdata will be in internal communications, information dissemination, information processing and computer assisted instruction application. Thereafter there are wide possibilities in entertainment and personal computing.

Developments with terminals are continuing. Chips - a new generation of integrated mass-produced viewdata products - will be available in 1981, and will provide flexibility of the system, providing local, personal peripheral terminals, a few hundred terminals, and a few thousand terminals with a function viewdata again, the market are substantial.

The pace of development in this leading-edge area is remarkable. Viewdata systems have acquired systems for many applications, but the pace is also for the future. It is the future that will succeed in business. It is the future that will succeed in business. It is the future that will succeed in business.

Prestel will have served its purpose in the UK, but its true glory is yet to come. It is not the end of the road. It is the beginning of a new era. It is the beginning of a new era. It is the beginning of a new era.

Dr ISRAEL BERKOVITCH EXPLAINS HOW COMPUTER TECHNIQUES ARE HELPING TO TAKE 19TH CENTURY RISK OUT OF THE 20TH CENTURY BRITISH MINING INDUSTRY

MINOS makes the colliery a safer place



MINOS in action again - this time at the Bagworth conveyor belt transfer point.

IT WAS probably 3,000 years ago when the ancient Chinese started scratching coal out of the ground. I have not seen any estimates of when the same process started in Britain but it is certain that coal-mining developed into an organised industry in this country during the 16th century.

This ancient industry has made enormous strides in recent years and computers have begun to contribute greatly to growing reliability in mining operations. Where, in fact, can computers be employed usefully in our pits and what do they achieve?

In the 34-year period since nationalisation, the mines have been mechanised increasingly with great benefit to both human safety and productivity.

The single over-riding impediment facing the industry at the moment" in the words of NCB Director of Mining Research, Peter Tregelles, is that of machine performance.

It is in this area that computers are being applied in order to realise the full potential of the mechanised equipment.

Monitoring

In more general terms, the researchers were able to report last month three major MINOS applications, firmly established and available on a commercial basis.

● Monitoring and controlling conveyor belts and coal bunkers for coal transport underground at 27 collieries, with five further systems ordered.

● Monitoring ventilation for management at five collieries.

● Coal face monitoring through FIDO at 14 collieries with 13 further systems ordered. When these are completed a total of 110 coal faces will be covered by the system.

Associated with this programme is obviously another dealing with instrumentation. Besides all that is demanded of instruments in any job for use with computers, notably reliability, these have to be "pitworthy" - standing up to severe conditions of use and electrically safe for use in mines.

They include an ultrasonic belt load monitor which is a big advance over belt-weighers. For deep bunkers, radar has been applied to monitor the level of coal where depth exceeds 50 metres.

To determine the percentage of stone in the coal on a belt, out-cleat techniques are being examined.

Misalignment

An ingenious idea for giving an absolute indication of the position of the pit-edge, independent of the existing indicator, has involved using magnetic stripes on winder

ropes, a valuable safety measure detecting slip or slack rope.

Further monitors measure conveyor belt speed, detect tears and misalignment, and determine any slip between the drive and the belt - an important source of heating that can lead to fire.

The principle is that a proximity sensor counts the holes in the roller driving the belt and another counts those in a roller driven by the belt. The difference measures slip.

So far, the MRDE claims that introducing MINOS has meant that fewer men are needed on the transport systems, delays are reported accurately and the equipment helps greatly in diagnosing areas needing maintenance attention.

When the transport systems are maintained properly, they now give "95 per cent clearance availability to the face".

Where FIDO has been applied, it has given a stimulus to keeping machines in use; machine delays have been reduced and over half last less than three minutes.

The ventilation systems are at an earlier stage of application, but have shown a marked superiority in comprehensive safety surveillance over previous systems of monitoring.

Inconceivable

Short-term developments include improving transducers and introducing programs to optimise bunker use and to segregate store handling.

FIDO is being improved by providing editing facilities, eliminating overlap problems or spurious delays and including data on machine position which managers have requested strongly.

NCB chairman Sir Derek Ezra has commented that the new technology is providing the means to measure in ways that are intrinsically more reliable and to calculate variables that would have been inconceivable without present processing power.

Nevertheless, MRDE has begun further work to equip MINOS Mark 2 with distributed processing and intelligent outstations giving

local control of individual plants.

To turn, this calls for work on the transmission systems which may extend up to about 10 kilometres in a sixth colliery; integrating control systems into multi-colliery complexes could raise this figure to 30km.

Transmission systems will consist of local links at 600 bits/sec, colliery links for monitoring and control at 4800 bits/sec and inter-colliery links at 64 kbit/sec.

Apart from meeting the need for intrinsic safety of equipment used in mines, MRDE uses standard telecommunication techniques and protocols and is beginning work on optical fibre transmission.

Interrogation

Using secondary computers for management information has been under study for several years; these were used to collect and store summary data for long periods both for interrogation when needed and allowing managers to analyse longer-term trends.

This is also growing into a man-

agement information system, based on computer disc storage with versatile presentation and interrogation facilities, now under test and assessment.

About six collieries have computers installed at their coal preparation plants, where coal is graded into different sizes and "washed" by specific gravity into different grades corresponding to different amounts of self-forming incombustible matter, in the coal.

The aim is to optimise plant availability. Associated with this project is development of new monitors for determining ash, sulphur, coal moisture and its calorific value.

Discussions about technical improvements underground tend to lead to the key question of when it will be possible to automate coal-mining completely and withdraw men from potential danger areas.

On this, expert opinion is understandably cautious but work is in progress on a microprocessor system mounted in a coal shearer.

It will steer the power-loader automatically in the vertical plane, monitor and control the advance of

the coal face and monitor how the machine is operating (what is called "the machine health").

Aspiration

What happens on the coal-face is so complex dynamically, however, that successful full automation is thought to be an aspiration for the more distant future.

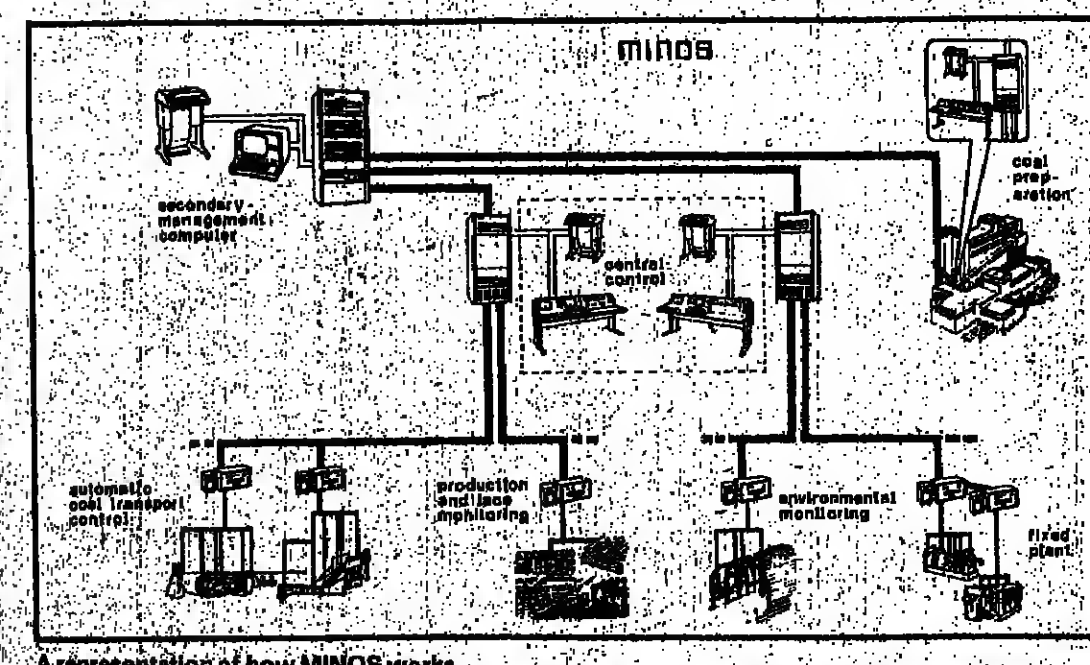
Nevertheless in many other, though more limited ways, the computer is helping to make our coal mines safer and more productive.

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A representation of how MINOS works.

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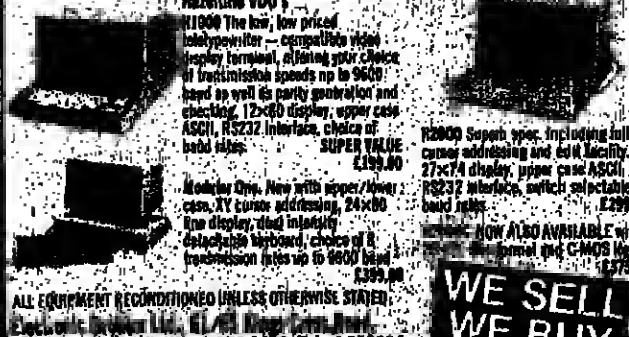
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John Lane, 4 Consultants
John Harland, Consultants
Steven Smith, General Appointment
William Johnson, General Appointment
Kevin McNamee, General Appointment
Peter Hayes, General Appointment

MANCHESTER/GLASGOW
Theresa Kelly, Tel: 0172 8061
David Allen, Tel: 0172 8061

BIRMINGHAM-BRISTOL
Via Street 021 251-4838
Classified Production 01 651 3500 Ext.
3104 News 1 page

If it's not here, it's here.

It would take virtually all of 'Computer Weekly's' Appointments pages to show you every one of the opportunities we have on our files at Knight Computer Services.

Instead, we'll compromise.

Here's a sample. We hope it shows us for the serious professionals we are. Our standards are high. The choice is wide.

The jobs we handle are only the best.

So, if you don't see exactly what you're looking for this week, take heart and return the coupon or call us today.

Permanent

ANALYST/PROGRAMMER
LONDON/PARIS **£9,000**
MINIS

A major film company seeks an Analyst/Programmer with solid Cobol background, and on-line interactive systems experience for mini system. London based with frequent trips to Paris. Ref: R101

SHIFT LEADER & SNR-OP
OIL CO. **VICTORIA**

Extensive OS MVS JES2 experience essential. Top salaries and real prospects with this large international corporation. Ref: R102/3

OPERATORS RELY ON
KNIGHT

for the best selection in town - contract and permanent, UK and Europe. For full details of these and other vacancies call us today.

Contracts

★ **LONDON**
Programmers: IBM COBOL 8100
DPPX/DTMS batch and on-line IBM
4341 experience useful. Ref: 268

★ **LONDON**
COBOL Programmers: IBM 4341 CICS
DL1 for a DOS/VSE etc. Ref: 313

★ **SAUDI ARABIA**
Programmers & Analysts: IBM PL1-
IMS at all levels. Mark IV TSO SP
IMSDB & IMSDB experience useful. Ref: 299

★ **OXFORD** Programmers: ICL 2900 VME/8
FORTRAN. Ref: 322

★ **DERBY** Programmer: PDP RSX11/M MACRO 11. Ref: 318

★ **HANTS** Programmer: UNIVAC 1100 COBOL
DMS. Ref: 324

★ **LONDON** Systems Programmer: IBM MVS with
DG exp. Ref: 311

★ **BRUSSELS** Programmers: PDP RSX11
FORTRAN or MACRO 11. Ref: 326

★ **SWITZERLAND** Programmer: ICL ME20 COBOL
IMS. Ref: 317

★ **HOLLAND** Analyst/Programmer: COBOL with
Chem degree. Ref: 318

For full details call Murray or Denise. Out of
hours, ring Richard (01-340 1188) or Denise (01-
897 4144).

01-491 4706

or when busy 01-439 3411

Knight Computer Services Limited
14 Old Park Lane, London W1Y 4NL

Staff Services Division of BOC Computer Services and
a member of the Computer Services Association

Knight

Personal

Please write in ballpoint, using block capitals

Surname _____ Forenames _____

Tel. Home _____ Office (discretion will be used) _____

Age _____ Nationality _____ Car _____

Are you prepared to relocate in UK? ☐ Abroad? ☐

Experience

Place no. of years in box, e.g. IBM 360/370/4

Machines Please specify model

IBM 360/370 _____
IBM 303X _____
IBM 43XX _____
IBMS/32/34 _____
ICL 29XX _____
ICL 190X/290X _____
DEC _____
Burroughs _____
Univac _____
Honeywell _____
Others _____

Job Titles

Programmer _____
Systems analyst _____
Analyst/programmer _____
Systems programmer _____
Project leader _____
Operator _____
Operations supervisor _____
Consultant _____
Sales representative _____
DPM/Systems Manager _____
Other _____

Applications

Commercial _____
Finance/Banking _____
Scientific _____
Process Control _____
Telecommunications _____
Other _____

TP Monitors & Database

CICS _____
IMS _____
IDMS _____
IDS _____
Other _____

Programming languages

Cobol _____
PLI _____
Assembler _____
Pascal _____
Fortran _____
Basic _____
RPG _____
Other _____

Position sought

Please state briefly the type of appointment you are seeking

Contract ☐ Permanent ☐ Other ☐

Minimum salary _____ Notice required _____
Desired start date _____

MYRIAD

UNIVAC 1100 IBM 370 DISTRIBUTED MINIS

USER SYSTEMS SPECIALIST
TO £11,500

WEST LONDON

To meet the increasing demand for information services from users the Users Systems Support Group has been expanding steadily during the past two years. To continue this expansion they are now seeking an additional person who will provide consultancy and technical support.

Candidates will ideally offer over five years' varied experience of systems and programming with UNIVAC 1100 and Timesharing expertise being of particular interest. The role offers the person appointed the opportunity to broaden their computing knowledge within an expanding environment where data processing is recognised as essential to the company's growth.

TECHNICAL PROGRAMMER
1½ YRS. + COBOL. TO £8,000
WEST LONDON

An interesting opportunity exists for an enthusiastic Programmer to join a small group engaged in a wide range of systems activities. The successful candidate will design and develop small specialist systems to run on both mainframe and mini-computers as well as providing detailed technical support to users.

This role is most likely to suit a person with eighteen months' to two years' COBOL experience who is looking to move away from the routine of project development into a role where his/her talents, interests and abilities will be given ample scope to expand and where a working knowledge of a wide range of hardware and software will be rapidly gained. A current appreciation of a second language will be advantageous as would a Computer Science degree, although this is by no means essential.

Located in Hammersmith, London, W.6 our client is a major international engineering and construction organisation. Career prospects are excellent and the employee benefits offered include: free life assurance, flexitime, paid overtime, interest-free season ticket loans and a company pension scheme. For further information contact Myriad Appointments: W.8.

Ref: NW1/0502

JUNIOR BUSINESS ANALYSTS

CITY

£7,500-£9,000

A major international organisation is urgently seeking to appoint an additional two ambitious and self-motivated people following the expansion of its City office.

Applicants will be interested in business matters; keen to develop management skills in a position offering job satisfaction, high rewards and the opportunity of developing personality and expertise in the Computer industry. Dealing with people, developing relationships and understanding client requirements will be a major aspect of the work, involving communications and computing skills.

Under 27 years of age you should be well educated with either programming or analysis experience gained in a commercial environment. In addition to a confident and outward going personality the ability to work on your own initiative is a key requirement and the potential to grow with the company is of prime importance.

These positions offer a first-year salary in the range £7,500-£9,000 and substantially higher rewards will be achievable following comprehensive training during the first year of appointment. The Company offers a professional approach to computing issues resulting in a high competitive spirit and united commitment to growth.

Ref: S1/0502

SYSTEMS ANALYSIS IN THE CITY

£8,000 - £12,000

Our client provides a unique service which combines modern computer technology with comprehensive investment information on all the major world stockmarkets. They operate one of the largest real-time terminal networks in Europe supplying a comprehensive and sophisticated computerised information analysis service based upon a large IBM-compatible mainframe with TOTAL database management system.

In order to meet a sustained growth in the demand for their services, our client requires additional Systems Analysts for a range of development projects to be taken from feasibility to implementation and beyond. Previous experience in broking/finance applications would be an advantage, but full training will be given in all areas. Although not essential it is likely that the successful candidates will have a numerate degree and some experience of Assembler Programming.

If you like problem solving, plenty of user liaison, the opportunity to work on one's own as well as in a team (with the real prospect of leading a project) then contact Myriad now to discuss the position in detail.

Company benefits include a high starting salary, non-contributory pension, free life assurance, LVE and an interest-free season ticket loan.

MYRIAD APPOINTMENTS LIMITED

30 Fleet Street, London EC4Y 1AA Telephone 01-353 0981 24 hours

IBM Systems Engineers

W. Germany: Salary to £20K

On behalf of an internationally renowned supplier of DBMS and T.P. Software Products we are seeking several IBM oriented Systems Engineers with extensive knowledge of some of the following products and operating systems: CICS, IMS, MVS, TSO, ENVY, IRON, TOTAL, IDMS or SHADOW. Technically, you must demonstrate 5 years' continuous exposure to the implementation and/or

Support of Data-Base and Teleprocessing Systems in a large or multi-user IBM or AMDahl installation. The Company is offering superb permanent career positions in its new German office and offers higher than average salaries (even by Continental standards). There is a strong preference for those with a working knowledge of German. Ref. L/77A

Business Consultants

Central London: Salary to £14K

Your past experience in the Data Processing industry has probably given you the ability to identify and solve problems from both a business and technical point-of-view. If you also have good personal communication skills and a strong desire to join a successful and prestigious Management Consultancy, then our client, based in Central London will be very

interested to hear from you. Particular requirements are for graduates aged 28 to 34, who can demonstrate extensive practical experience in the areas of Office Automation, Word Processing and Communications Networks. Respondents with specialist expertise in PRESTEL and VIDEOTEX applications are especially welcome to apply. Ref. L/77B

Real-Time Applications

German Speaking: Salary to DM 70K

Consultants, Project Leaders and Programmers are urgently required by a leading U.K. Systems House with a substantial overseas presence. Established project teams in Germany are currently developing mini and micro-computer based real-time software for a wide variety of clients. Applicants must have at least two years' experience of Assembly.

Pascal or Algol gained in a real-time environment. Specialist expertise in the fields of Communications Networks, Message Switching or Process Control will be of particular interest. As a degree of customer liaison is required the ability to converse in German is essential although total fluency is not expected. Ref. L/77C

Database Analysts/Designers

London & Berkshire: Salary to £13K

Our clients are seeking Database Analysts and Designers for their West End and Thames Valley offices. Applications areas will include manufacturing, production and materials control, scheduling and trend forecasting, budgetary control and cost analysis. Candidates must offer design experience in an installation which currently uses

one or more of: IMS, TSO, DL1, TOTAL, MVS, MAAPICS, or MRPS. A feature of these positions is the extensive degree of client contact in the form of seminars, product demonstrations, feasibility studies and management reporting. The Company offers an extensive and worthwhile range of ancillary benefits. Ref. L/77D

Process Control Programmers

London & H. Counties: Salary to £10K

A leading supplier of Industrial and Process Control Hardware and Systems Software is seeking to recruit Applications Programmers and Support Analysts for its U.K. Headquarters. It is obligatory for all applicants to have at least one year's experience in either Assembly or FORTRAN and those who have also had exposure to PASCAL, BASIC or

COBOL will be of particular interest to our client. You will play a significant role in all stages of software and systems development from product planning to installation and live running. Since travel both nationally and internationally will form a significant part of the job function, mobility is an essential criterion for these positions. Ref. L/77E

Logistix, 10 Grenville Place London SW7 4RW

01-373 3043



Telex: 28800

DISTRIBUTED SYSTEMS LIMITED

RECRUITMENT DIVISION

MAJOR BANK IN GREATER LONDON AREA has vacancies for:

TECHNICAL SUPPORT GROUP

SYSTEMS PROGRAMMER IMS/DC

with at least two to three years' experience of operating and tuning on-line IMS systems and with management potential. £10,000-£13,000. Ref. 81/27

SYSTEMS PROGRAMMER 370/VM

with an in-depth understanding of VM and experience of operating system generation. Two vacancies. Up to £13,000 for senior post. Ref. 81/28

NEW APPLICATIONS DEVELOPMENT GROUP

SYSTEMS ANALYST

with sound money market and foreign exchange applications experience. Hardware background secondary. Ref. 81/29

SYSTEMS ANALYST

IMS DB/DC OS/VS1 experience essential. Banking applications development background. Ref. 81/30

We would welcome applications from anyone having the skills applicable to these vacancies whether they are seeking permanent employment or contract assignments.

70 Borough High Street, London SE1 1XP
Tel: 01-403 3458/1568

TECHNICAL AUTHORS

Hardware and Software Manuals with the USER in mind

The success of highly advanced, sophisticated computer systems is often determined by the ease with which they can be used.

Racal-Redac Ltd. has consistently recognised the importance of this factor and our range of Computer Aided Design Systems and Business Management Systems have been developed specifically with the user in mind.

The importance of User manuals is therefore fundamental and we are currently seeking to recruit a number of Technical Authors to produce hardware and software manuals on a range of new Generation Systems in the following areas:

- Computer Aided PCB and Mechanical Design
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Vacancies exist for experienced Authors who are currently working in an Electronics and/or computing

environment and who have the ability to translate complex Hardware/Software specifications into usable manuals. Consideration will also be given to applicants with a sound knowledge of computer applications either commercial or scientific, and wish to move into the technical publications profession.

Applicants who can show consistent advancement within a computer operations department, would be particularly suitable.

Racal-Redac Ltd. is one of the fastest growing companies within the Racal Electronics Group and can therefore offer excellent employment benefits and prospects for career advancement.

Please apply with details of age, qualifications and experience to: Brian Ashcroft, Personnel Officer, Racal-Redac Ltd., Newtown, Tewkesbury, Glos., GL20 8HF. Tel: 294161.

Britain's fastest growing electronics group

RACAL

SHAPE TECHNICAL CENTRE

THE HAGUE, NETHERLANDS

A NATO technical/scientific establishment has vacancies on its international staff for:

SCIENTIFIC ASSISTANT

(Post 1)

DG.46.080 = tax-free*

to participate in analysis, program design, coding and other programming activities needed to develop large real-time, multitask application programs on mini- and microcomputers.

SCIENTIFIC ASSISTANT

(Post 2)

DG.46.080 = tax-free*

to participate in the design and operation of advanced radar signal processing and simulation facilities and the development of simulation and analysis programs. These activities will include both real-time application of micro- and minicomputers and programming activities on the Centre's CDC Cyber computer.

PROGRAMMERS

(Post 3)

from DG.53.125 to DG.62.197 = tax-free*

to participate in all phases of program development on various challenging projects including complex real-time systems (e.g. embedded computer systems, computer networks), scientific computation, data management and simulation. Development and target machines include a large CDC Cyber 740 and a variety of PDP-11 configurations. Personal professional development in Computer Science and Software Engineering will be encouraged.

QUALIFICATIONS:

Post 1 and 2 -

Education to higher Secondary level or equivalent professional experience. In addition, applicants must have experience with at least one real-time operating system (preferably RSX 11), at least one higher level language, and assembly language programming. A good knowledge of English is required. Additionally for Post 2 ONC/HNC or equivalent in electrical engineering is preferable.

Post 3 -

Education to GCE A Level or equivalent, with at least 3 years' relevant experience in the use of higher level languages such as Pascal, SIMULA, FORTRAN. A knowledge of other modern software development tools and techniques would be advantageous. A good knowledge of English is also required.

* This is the gross annual salary for non-Dutch married officials with children.

Candidates who are nationals of one of the NATO countries are invited to send full details of training, experience and personal data to: Personnel Officer, SHAPE Technical Centre, PO Box 174, 2601 CD The Hague, Netherlands, indicating for which specific post(s) they are applying.

datascene

Analyst/Programmers

MINI HARDWARE

£8,500

Our client is an international manufacturer within the computer industry. They are seeking to fill two positions and require that applicants possess a good knowledge of COBOL and should be familiar with commercial applications in a real-time environment. There is a wide range of company benefits, including a profit sharing scheme paid bi-annually, a half month's salary pre-Christmas payment, plus a substantial company package for the right people. R.4982

Analyst/Programmers & Programmers

HONEYWELL

£7,500-£10,500

A leading manufacturing company require two experienced Senior Analyst/Programmers, one Analyst Programmer and one Programmer to complement their existing team. Experience required ranges from 2.5 years of on-line working with COBOL. A sound knowledge of commercial application and project management will be advantageous to those applicants applying for the senior positions offered. The company benefits include five weeks' holiday, product discount, subsidised canteen and Pension Scheme after one year's employment. R.8013

Basic+/Basic+2 Programmers

£7,500

We are in contact with three banks in the City who are seeking programmers with upwards of eighteen months' experience in BASIC +, BASIC + 2, or AIMS. Successful applicants can expect to be working in a batch and real-time environment on applications such as foreign exchange and eurobonds. Opportunities for career progression are excellent and the employment packages offered are without equal. R. GEN

Analyst

IBM

c. to £9,000

Our client is well-established and has a recognised name in the food industry. The company seeks analysts with ideally a broad experience of business to work on their IBM 4341 machine.

Candidates should have a good programming background with a realistic commercial outlook rather than be simply analysts. A total of 4 years' experience of data processing is expected. In addition to a good salary, the company offers 23-25 days' annual leave and a staff purchases scheme. D.8012

RPG II Analyst

Programmers

IBM SYS. 32, 34, 38

to £10,000

LONDON CITY
An excellent opportunity has arisen for experienced Analyst Programmers in progress into consultancy. Ideally you will have at least three years' IBM-RPG II experience, one of which should involve systems work. Applications will revolve around banking and insurance projects and will include database, communications and financial planning and modelling. Applicants must be of smart appearance and have been educated to A-level standard. An excellent benefit package is offered and futuristically will include a car. M.4726

Programmers

IBM 370 and 4331

to £9,000 + BONUS

MIDDLESEX
A finance company in Middlesex urgently require IBM Programmers to complement their existing team. A minimum of 6 months' experience is required although candidates will preferably have some 2 years. In either case experience of CICS is essential. A knowledge of DL1 and financial applications would be advantageous. In return they offer salaries of £9,000 together with a bonus, free BUPA, non-contributory pension and life assurance and lunch vouchers. D.4929

Analysts and Programmers

ICL 2900

to £9,000

SURREY
A leading insurance company in a pleasant Surrey environment seeks both Analysts and Programmers for their 2900 machines. Applicants should have a wide knowledge of 2900 machinery with preferably experience of insurance or pension applications. Salaries of up to £9,000 are supplemented by a wide variety of financial benefits which includes a mortgage subsidy after an introductory period. The situation is within 3 minutes' of the main-line station. D.4654

Programmers

ICL 2900 and IBM CICS

to £8,000 + BONUS

CENTRAL LONDON
Our clients are a fast expanding software house in the West End. They need COBOL programmers for both ICL and IBM machinery for a variety of projects. Candidates should have a degree or its equivalent and between 1 and 4 years' experience of either or both of 2900 and IBM CICS. Knowledge of PLAN will be useful. Salaries of up to £8,000 are offered with a realistic chance of an additional £1,000 bonus. The above vacancies are only a small selection from those currently on offer and we are always delighted to talk to experienced systems and programming staff wishing to further their careers. (449)

Datascene International Limited,
Scapine House,
100-173 Regent Street,
London W1A 7PS, Tel: 25551

01-439 7871

24 hour answer phone

MODUS

Modus Management Services Ltd
148 Watling Street, Radlett,
Hertfordshire, WD7 7JL

International Personnel Consultants

Telephone: Radlett (09276) 3077

CSC

COMPUTER SCIENCES COMPANY

Computer Sciences, now in its twentieth year of operation, is the largest hardware independent information sciences company in the world.

The services CSC provides cover every aspect of computer technology: from requirements analysis to the design and implementation of large real-time information systems (particularly command and control); from the design and development of many different compilers to the development of complete operating systems for a number of computers; to the design of data communications networks.

The company has personnel resources of over 15,000 employees located in over 100 offices worldwide and also owns its own remote processing service, INFONET.

CSC UK was formed in 1969 and is perhaps best known for the development of large projects such as the London Airport EDP Scheme (LACES) and the Royal Navy's Command, Control and Information System (OPCON).

Towards the end of last year the company was awarded a number of similar projects, as a result of which several extremely interesting and challenging positions have been created. These are urgently required to be filled and applications are therefore invited from candidates who feel they fit one of the following categories:—

Systems Design Consultants

£11,500-£17,000 depending on experience

The salary range above clearly indicates that these positions offer tremendous scope to good people. We will expect to see extensive large systems design experience, thorough understanding of how database and on-line systems are built and co-ordinated and — most importantly — evidence of being capable of working from the higher conceptual levels down to detailed design, on large projects.

At least one of the positions available requires extensive knowledge of ICL 2900 hardware and IDMS and associated software, whilst Data Analysis (or similar) skills are essential from all candidates.

Comms Software Designers

£10,000-£13,500 depending on experience

We seek talented senior team members, people who can conceive and design networks incorporating packet switching, voice and data transmission etc. Software expertise is a vital ingredient in the equation, so experience of software modelling, software package enhancement or amendments must be present.

An important point to note is that pure specialists in comms or telecomms will not be suitable. Certainly communications knowledge is of primary importance but individuals must have a broad and comprehensive view of systems design and therefore be capable of ensuring that the communications side of a large distributed system is properly designed and implemented.

The quoted salaries are at the top end of the normally available market rates and reflect the fact that CSC is a highly professional and reputable company. Naturally, benefits are in line with this and include BUPA, company pension scheme and a car leasing scheme for senior staff. Season ticket loans are also available and are interest free and relocation expenses can be made available if appropriate.

Contact: Andy Wright or Mike Creamer at Modus
or K. R. Barge on 01-439 4511

01-439 7871

£12K APPOINTMENTS

**Up to 15,000 pounds
tax-free**

The Public Institution for Social Security of Kuwait has the following vacancies in its DP Dept.:

DP INSTRUCTORS

A good background of classroom instruction in programming and in particular COBOL, ALC and VSAM. Knowledge of 370 operating systems and JCL would be an advantage.

These positions offer excellent overseas benefits packages including:

- FREE FURNISHED HOUSING
- FREE HEALTH CARE
- SIX-WEEK VACATION
- FAMILY ACCOMPANIED TOUR
- ROUND-TRIP AIR FARE TO HOME COUNTRY ANNUALLY

If you feel you would be interested in an overseas assignment and are willing to work hard and make a positive contribution write to:

**THE DP MANAGER
P.O. BOX 24324 SAFAT
KUWAIT**
by February 19, 1981

Sales Executives

Currently Earning
£14,000 - £25,000

The Michael Page Partnership wish to hear from Senior Sales Executives and Sales Managers whose track record to date has demonstrated superior ability. We are an established consultancy who specialise in the search and selection of sales and marketing executives for the computer industry.

Perhaps your current appointment is fulfilling your career needs, but nevertheless, you are interested in future opportunities, alternatively, you may be actively seeking a new appointment now.

You may be looking for:

- ★ A higher income
- ★ A more sophisticated product
- ★ A totally professional peer group
- ★ A more authoritative role

Or, more likely, a combination of all these factors, then perhaps its time you spoke to us. Bear in mind, the best position for you may never be advertised.

In the first instance, telephone Mike Linford or Dick Glazebrook on: 01-405 0442. Or send a brief CV for their attention to the Michael Page Partnership. Any approach will be treated in the strictest confidence.

MP
Michael Page Partnership
Recruitment Consultants
London Birmingham Manchester

SULTANATE OF OMAN MINISTRY OF DEFENCE

**DATA PROCESSING
CONSULTANT**
£16,000 - Married Status

A DP Consultant is required to carry out an initial study of the feasibility of introducing systems into the MOD and the Services. The areas to be studied will cover all aspects of accounting including stock, payroll, purchases, cash receipts and payments, personnel and establishment records, fixed asset utilisation and maintenance records and inventory management.

The successful candidate will recommend the policy to be adopted to effect any proposed introduction of DP and draw up an outline plan for this. He will advise on the selection of hardware and software and assist the MOD and Service Managers in the development and implementation of approved DP projects.

The study is expected to take twelve months but an initial report, recommending future policy, is required within two months. The consultant will report through a joint services committee, to the Under-Secretary, MOD.

Applicants should have extensive computer systems and O and M experience, a record of successful project management, and be familiar with DP equipment development. Some experience would be an advantage but is not essential.

Employment offered on married status, one-year contract. Salary £16,000 inclusive of benefits and gratuity plus free accommodation and car. Fifty days' leave, of which ten days may be taken after five six months, remainder on completion of contract. Salary is inclusive of pay during leave. Air passage provided at start and end of contract with return air passage for leave. Similar air passage provided for wife and dependent children.

Telephone or write, for application form to Tessa Black, Astral Recruitment Associates, Astral House, 17/19 Market Street, London, W1R 0EX, 01-408 1010.

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DIRECT LINE 01-661 0121

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Communicating with the mainframe we have a Bares/1,
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As you can see there's plenty going on, and there
are plans for expansion in the near future on both the
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Currently we are looking for IBM Systems
Programmers with at least two years in Systems or Support
programming for the three levels, at least six months in
programming with little or no experience of Systems work.

Among other benefits we offer good career
prospects on a wide range of hardware and software, plus
free travel on LT services and valuable concessions on OR.

LONDON TRANSPORT

Phone Deborah Kelly on 01-227 3655, or write to
her at Staff Appointments, London Transport, 54 Broadway,
London, SW1 0BD for further details and an application
form. (Please quote ref. 493C)

LAMSAC Computer Advisory Officer

PO 2 (6-10): £12,537-£13,629

The Local Authorities Management Services and
Computer Committee provides advice to Local Authorities
on a comprehensive range of management services. A
vacancy has arisen for a Computer Advisory Officer based
at 3 Buckingham Gate, London, SW1. The post involves
a stimulating challenge. Essential are proven computer
achievement in a senior position, ability to run a team and
sound business, financial and administrative skills. A
degree or professional qualification, experience in local
government computing, specialised knowledge of systems
software and experience with smaller computers would
all be advantageous.

Financial assistance with relocation expenses will be
given in appropriate cases.

Further details and application form from
S. P. Barnes, Director, LAMSAC
3 Buckingham Gate, London SW1E 6JH
(01-423 2830 x 52). Closing date 28th February 1981.

JBA

Director Computer Services

Working to £17,000+ car
Hogg Robinson Travel Limited, a major force in the travel business, has
identified the need for a senior computer professional to strengthen the
management team.

The appointee will be responsible for the overall management control of
the data centres, establishing and maintaining a communications network
with associated facilities and for liaising with the directors and senior
managers in the subsidiary companies on all matters pertaining to the
provision of the highest level computer services. As a senior member of the
management team, will report directly to the chairman.

Applicants should be able to demonstrate a successful track record in the
planning, implementation and management of large scale communications
networks and associated business systems, not necessarily in the travel
industry, but this would be advantageous. A mature business acumen and
the ability to implement decisions is of prime importance.

Ten years practical experience in the relevant areas and the ability to
organise and direct supporting staff, plus demonstrative negotiating skills
with external bodies are considered creditable attributes.

Please apply with comprehensive career details, including scope of present
responsibilities to:

Margaret Stevens,

**JAMES BAKER ASSOCIATES,
International Personnel Consultants,
32 Saville Row, London W1.
Tel: 01-439 9311.**

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BUCKS/HERTS

Knowledge of UNIVAC/IBM with TIPS/CMS/CICS essential

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Fortran background with HP Hardware

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Job no 1-170

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MSD

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Further particulars may be obtained from Mrs. Doreen Birch, Northcote House, Okehampton, Devon, EX4 4QJ, to whom applications (in confidence) should be forwarded by March 8, 1981. Please quote reference No. 3203.

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- Have an excellent knowledge of one Community Language and a satisfactory knowledge of another;
- be nationals of a member country;
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Commission of the European Communities
200 rue de la Loi, B-1049 Brussels
Please quote reference M/M/
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Contact: Margaret Stevens

Software Designer

Near Oxford

c. £10,000

This young manufacturing organisation of professional computer controlled recording equipment for sound studios and broadcasting has rapidly established itself as the leading innovator in its field. The software content of its systems is always increasing and will have a central place in the structure and ergonomics of future designs. The Company's expansion means that they now have a vacancy for a Software Designer with proven analytical skills and who has a specific interest in applying computer control to help make machines more usable and effective. Applicants should have experience in real-time control using mini or micro computers and should enjoy working in an independent fashion. Added advantages would be a working knowledge of an ASSEMBLER language and of multi-processor systems.

The Company expects to continue at rate of progress and there will always be opportunities for the future career of the successful applicant.

Contact: David Hendry

Banking Analyst

c. £10,500 + benefits

City

The London branch of this prestigious European bank is about to embark on a major programme of new applications development and is seeking an experienced Systems Analyst to play a key role in this project.

Experience must consist of at least 18 months Systems Analysis in a Banking environment coupled with a knowledge of foreign exchange and/or money market applications. Long term career prospects are excellent and a good salary is supplemented by attractive fringe benefits.

Contact: David Hendry

SNA Specialist

£12k - £15k

Berkshire

Our Client, well known throughout the world, is developing communications software for a large network and requires an SNA Software Specialist to join the team. Applicants must have a sound IBM software background and be full familiar with SNA Internals. Ability to lead a team would be an advantage. Excellent salary, benefits and career opportunity.

Contact: Jim Baker

Analyst/Programmer

Hertfordshire

neg. to £10,000

Our client, a well established marketing company who specialize in sound recording equipment, are currently expanding their D.P. department. They are developing a sophisticated real-time sales and distribution system as well as order processing and general batch, all of which use data base techniques. They require an Analyst/Programmer to assist the Computer Manager in the development and maintenance of their IC 2904 site. The successful applicant will be required to have a working knowledge of COBOL and be able to work under his/her own initiative.

An excellent salary coupled with attractive fringe benefits complete the package.

Contact: David Hendry

Support Analyst

c. £10,000 + car + bonus

West London

Following gradual expansion, our client, a market leader in mini and micro based systems, need to strengthen their existing support teams. Responsible for particular customer installations, you will provide full pre and post sales support, client liaison and on-site implementation. A thorough understanding of business problems, an outgoing personality and an eye for detail are essential qualities. Your background should include commercial system design and analysis, preferably in a software house and considerable knowledge of COBOL or BASIC.

An excellent bonus scheme plus attractive range of fringe benefits. Contact: Brian Portillo

Analyst/Programmer

South London

£8,250

Our client, a large international organisation who are component makers to the European industry are currently strengthening their d.p. team and so have a requirement for an experienced Analyst/Programmer. Candidates should have a sound knowledge of RPOL with some exposure to ASSEMBLER and a minimum of 18 months experience in a similar environment. Basic Terminal handling procedures would be an advantage.

Contact: Paula Bentley

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A challenging opportunity has arisen within a leading American engineering company based west of London. The principal functions of the position are to initiate and direct activities pertinent to the development, maintenance and support of technical and scientific computer systems used throughout the company in technical analysis and design; to maintain and, where possible, enhance the company's competitive position with regard to engineering technology. Candidates must possess a BSc in engineering or equivalent with 8-12 years' total experience or 4-8 years as an Engineering Analyst. Excellent relocation is offered where appropriate.

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This position has been created by the above-mentioned engineering company to support the provision of interactive computer services and mini-computer based applications to a high level of reliability. Applicants must possess a minimum of 3 years' experience including an understanding of interactive systems. In addition, he/she must be prepared to keep abreast of software/hardware in current use and to provide user training and maintenance of standards/user guides. A working knowledge of APL would be a distinct advantage. Excellent relocation is offered where appropriate.

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CARDIFF £9,735 - £11,260

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Your responsibilities will include setting priorities, technical and scheduling support, user liaison, and participating in the implementation of the new hardware.

To apply you should have a minimum of five years experience in computer operations, and be working at present in a supervisory capacity. Our computer operations cover a 24-hour, five day week, you will be required to work appropriate shift patterns.

Starting salary is £9,735 including shift allowance, rising to £11,260, and the benefits are those normally associated with a large progressive organisation including, where appropriate, assistance with relocation expenses.

Please write, giving full details of age, qualifications and experience, quoting ref. H44/164/CW to: Graham Moore, Senior Personnel Officer, Wales Gas, Snelling House, Bute Terrace, Cardiff CF1 2UF.

WALES GAS

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The Computer Centre is manned 24 hours per day and, therefore, these positions will entail shift work, for which a substantial allowance is paid.

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For an application form, telephone or write to: Mrs. F. H. Wakefield, Senior Personnel Officer, Abbey National Building Society, 27 Baker Street, London, W.1, Tel. 01-486 5544, Ext. 477.

Closing date: 27th February, 1981



14421

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Your name will not be released until we have briefed you and you have given your consent. Please write to me, Teresa Hart Dyke, consultant in the project.

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Application forms may be obtained until February 23, from:

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FeatureSales and Marketing
February 26 Issue

If you are looking for sales and marketing professionals don't miss this special Computer Weekly recruitment feature highlighting the opportunities in computer sales and marketing.

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Copy deadline is Monday, February 23 although advanced space reservations are available.

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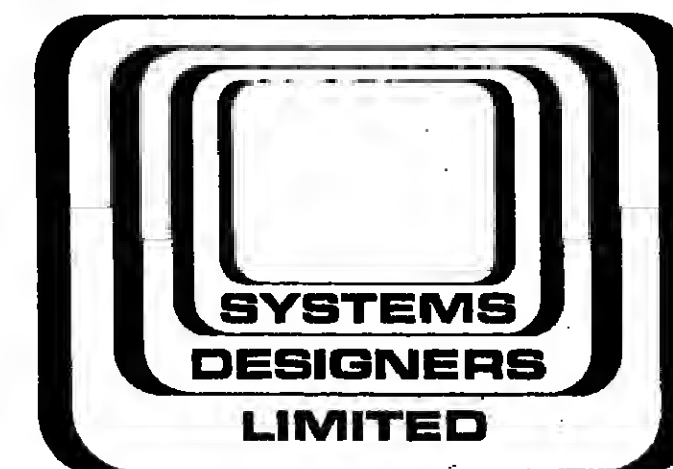
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The successful applicant will provide technical support to members of a team in a variety of activities and should have appropriate experience of on-line information systems or more of the following: System analysis and design, Data communication, installation planning and implementation.

Application forms may be obtained from The Assistant Director of Manpower Services, Glasgow Sub-Region, Strathclyde House, 10, St. Andrew Street, Glasgow G3 7AP, to whom completed forms, quoting Ref. G3106, should be returned by 28th February, 1981.

R.M.O. McCULLOCH
Director of
Manpower Services



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